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ABSTRACT

This resouce manual compiles research findings concerning treatment of pregnant addicts. Major topics covered are: (1) prevalence and classification of psychotropic drug use; (2) pharmacologic effects on mother and infant; (3) clinical management during pregnancy; (4) management of labor, delivery, and the immediate post-partum period; (5) management of the newborn; and (6) continuing care of mother and infant. Included in the appendix is a Neonatal Abstinence Scoring System for use in monitoring the passively addicted infant in an objective and comprehensive way. (Author/SS)

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Drug Dependence in Pregnancy:

Clinical Management of Mother and Child

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FOREWORD

The National Institute on Drug Abuse recently estimated that in 1976 there were more than a half-million persons using heroin regularly in the United States. Approximately one-third were female, 90 percent of whom were of childbearing age. In addition, almost 20,000 women of childbearing age were treated in methadone maintenance programs in 1976.

When these women become pregnant, they and their offspring become part of a high-risk population requiring special medical attention. Investigators have reported a high incidence of obstetrical complications related to heroin abuse, including toxemia, spontaneous abortion, placenta previa, abruptio placenta, and post-partum hemorrhage. Maternal opiate addiction has a negative impact on the neonate and multiple complications may arise. As many as 93 percent of the neonates of opiate-dependent women manifest withdrawal symptoms, a significant complication after delivery.

In most cases, the hospital system represents the only location where pregnant addicts can obtain needed health and social services. However, it is not clear how many hospitals have the expertise to provide services for the diagnosis and treatment of the drug problem and appropriate medical care before, during, and after delivery. Although special treatment programs for pregnant addicts have been instituted in several cities, there is little information regarding the availability and utilization of hospital services, the diagnostic and treatment approaches used, the numbers of pregnant addicts treated, and the status of the mother and child after delivery.

In recent surveys, it was learned that drug problems experienced by pregnant women often go undetected in hospital systems because of the lack of experience or familiarity with this problem. From the available data that have been collected, it appears that the special medical problems of pregnant addicts and their children are not being adequately addressed in many of our cities. Part of this problem is due to the fact that, until very recently, there was little research conducted in this area.

The research findings reported here have come from a variety of sources, and it is often difficult to compare the findings generated by investigators who have used different study methodologies

and studied different populations. Much of what was learned about the treatment of pregnant addicts has been reported at conferences and in professional journals, but little effort was made to integrate and evaluate existing knowledge so that it could be more easily incorporated into treatment systems.

This manual, prepared by a group of professionals pioneering in this specialized field, represents an important step forward in gathering relevant and practical information in one volume. Hopefully, it will serve as a resource book for hospital systems and drug treatment programs and will have a favorable impact on the delivery of services to pregnant addicts and their offspring.

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CHAPTER I

Prevalence and Classification of Psychotropic Drug Use

CONSUMPTION OF MOOD-ALTERING DRUGS

The magnitude of psychotropic drug use is frequently unrealized. In addition to juveniles experimenting with drugs, and individuals with chronic heroin dependence, large numbers of emotionally distraught individuals use psychotropic medications which are procured through licit as well as illicit sources. A general complacency exists with regard to licit psychotropic medications. Moderate utilization of these agents is rarely feared and is often believed to be safe and frequently beneficial. However, large numbers of psychotropic drug users are women of childbearing age. The extent of drug use during pregnancy is often underestimated, as are the effects of maternal drug use on the fetus and neonate. This unawareness is related in part to a common tendency to minimize the existence of problems that one finds socially unattractive. Nevertheless, the prevalence and sequelae of both licit and illicit psychotropic drug use during pregnancy indicate that the phenomenon represents a significant problem which must be recognized and addressed by health care delivery systems providing optimal medical care.

General Prevalence

Prescribed Medications

Psychotropic drugs, both licit and illicit, but especially the former, are in widespread use, with the attendant effects rarely realized. (See table 1 for a listing of common psychotropic drugs.) For example, 10 years ago enough barbiturates were produced to supply twenty-four 100 mg doses to every man, woman, and child in this country (1). A similar statement could also be made with respect to amphetamine production which, at that time, was sufficient to supply thirty-five 5 mg doses to this country's entire population (11). Over recent years new synthetic agents have appeared

I 2

TABLE 1. Classification of drugs affecting the central nervous system

Effect	Trade name or synonym
I. Generalized effect	
A. CNS depressants	
Ethanol	Alcohol
Barbiturates	"downers," "barbs"
phenobarbital	
pentobarbital	Nembutal, "yellow jackets"
secobarbital	Seconal, "reds"
Nonbarbiturate sedatives-hypnotics	
glutethimide	Doriden
methaqualone	Quaalude, Sopor
ethchlorvynol	Placidyl
methyprylon	Noludar
hydroxyzine[1]	Atarax, Vistaril
meprobamate[1]	Equanil, Miltown
Hydantoins	
diphenylhydantoin (phenyltoin)	Dilantin
Benzodiazepines[1]	
chlordiazepoxide	Librium
diazepam	Valium
flurazepam	Dalmane
oxazepam	Serax
Anesthetics	
nitrous oxide	"laughing gas"
halothane	Fluothane
Volatile solvents	
toluene	Toluol
naphtha	
benzine	
Cannabinoids (low dose)	
delta-9-tetrahydrocannabinol	THC
marihuana	"grass"
hashish	"hash"
B. Stimulants	
Amphetamines	"uppers," "speed"
amphetamine	Benzedrine
d-amphetamine	Dexedrine
methamphetamine	Methedrine, "crystal"
Cocaine	"coke"
Caffeine	
Nicotine	
Phenmetrazine	Preludin

[1] Frequently called minor tranquilizers.

TABLE 1. Classification of drugs affecting the central nervous system (continued)

Effect	Trade name or synonym
II. Localized effects	
A. Affective (limbic) centers	
1. Antipsychotic (depressant effect)	major tranquilizers
Phenothiazines	
chlorpromazine	Thorazine
thioridazine	Mellaril
prochlorperazine	Compazine
trifluoperazine	Stelazine
fluphenazine	Prolixin
Butyrophenones	
haloperidol	Haldol
Thioxanthenes	
chloprothixene	Taractan
thiothixene	Navane
2. Antidepressants	
a) Tricyclics	
amitriptyline	Elavil
nortriptyline	Aventyl
imipramine	Tofranil
desipramine	Norpramin, Pertofrane
doxepin	Sinequan
b) MAO inhibitors	
phenelzine	Nardil
3. Antimanics	
lithium	Lithonate
B. Psychotogenic (hallucinogens)	
lysergic acid diethylamide	LSD
dimethyltryptamine	DMT
mescaline	cactus "buttons"
psylocibin	"magic mushrooms"
dimethoxyamphetamine	DOM, STP
phencyclidine	PCP
cannabinoids (large dose)	(see section IA of this table)
C. Opioids[2]	
1. Agonists	
morphine	
methylmorphine	codeine

[2] Frequently termed "narcotics" or "opiates."

TABLE 1. Classification of drugs affecting the central nervous system (continued)

Effect	Trade name or synonym
diacetyl morphine	heroin
dihydromorphone	Dilaudid
camphorated opium tincture	paregoric
opium tincture	Laudanum
methadone	Dolophine
propoxyphene	Darvon
L-alpha-acetyl methadol	LAAM
meperidine	Demerol
2. Antagonists	
naloxone	
naltrexone	Narcan
cyclazocine	
3. Mixed agonist-antagonists	
pentazocine	Talwin
nalorphine	Nalline
levalorphan	Lorfan

to replace the barbiturates and amphetamines. In 1972, over 70 million prescriptions were written for diazepam (Valium) or chlordiazepoxide (Librium), at a cost to the public of approximately $200 million (4). Studies indicate that, over a year's period, 25 to 35 percent of adult Americans have used some licit psychotropic agent; a random sampling of persons on the street revealed 14 percent to have used such a drug, excluding alcohol, within the previous 24 hours. In fact, the prevalence of use of psychotropic drugs at any time has been estimated to approach a magnitude of approximately one-half of the United States' population (26), with one person in three using some type of psychotropic agent at least once during a 12-month period (27).

The licit use of these agents is associated with either a physician's prescription or the purchase of an "over the counter" medication. The most frequent psychotropic medications prescribed are the minor tranquilizers. In the majority of instances, these medications are not used for persons with a diagnosis of a specific mental disorder but rather to alleviate anxiety. This is true even with the prescription of the major tranquilizers and antidepressants (27). A study from the National Disease and Therapeutic Index for 1974 reviewing drug prescriptions by internists found that the average internist dispenses 25.6 drugs per day, with the use of tranquilizing agents ranking second only to the diuretics (23).

Narcotic use under medical sanction has never received its due consideration by the public. Attention is focused on illicit rather than medical use of these agents. Yet the extent of medical use of these agents is impressive. Blum, in 1967, estimated from data released by the Federal Bureau of Narcotics that enough opiate drugs were legally prescribed by physicians to supply 5.5 doses for every man, woman, and child in the country (6).

Nonprescription Medications

The use of "over the counter" (OTC) agents with abuse potential is equally impressive (table 2). Data from the National Marihuana Commission Survey revealed 56 percent of adults and 20 percent of youths surveyed to have had experience with one or more psychotropic OTC medications. Of these, 70 percent took one or more of such drugs within the past year (15).

Comparable data from other Western countries indicate that America is not at all unique in the consumption of these drugs and

TABLE 2. Commonly purchased over the counter psychotropic medications (nonanalgesic)

Group	Trade name	Contents
Stimulants	No Doz	caffeine
	No Nod	caffeine
	Vivarin	caffeine
Sleeping medications	Nytol	methapyrilene, salicylamide
	Mr. Sleep	scopolamine, methapyrilene
	Sleep Eze	scopolamine, methapyrilene
	Sominex	scopolamine, methapyrilene, salicylamide
	Sominex II	scopolamine, methapyrilene, salicylamide, Benadryl
Tranquilizing agents	Compoz	methapyrilene, pyrilamine
	Cope	methapyrilene, aspirin, caffeine, magnesium hydroxide, aluminum hydroxide gel
	Myles Nervine	Methapyrilene, sodium, potassium, ammonium bromide, niacinamide, thiamide, sodium bicarbonate, citric acid
Alcoholic beverages	beer	alcohol, various congeners
	wine	
	liqueur	
	liquor	

indeed is placed in a middle position among nine countries surveyed with respect to consumption of anti-anxiety or sedative agents (3).

Alcohol, although usually not considered a drug, presents a considerable social problem to approximately 9 million Americans. In New York City, this agent has been reported to be responsible for six times as many deaths as those that have occurred from illicit heroin use (2), as well as for an inestimable number of associated social and physical infirmities. Nicotine, also recognized as a major health hazard, is known to produce dependence and yet continues to be sold and used in increasing quantities even in the face of legally restricted advertising. The proportion of cigarette smokers in the U.S. population age 17 and over is estimated to be between 30 and 46 percent (22). Caffeine-containing drinks are consumed by the majority of the population of all ages, with the possible effects of excessive intake such as nervousness, irritability, anxiety, and palpitations just beginning to be realized. In short, the use of these licit agents is extensive.

The use of illicit drugs or deliberate misuse of prescribed medications is also substantial. Over one million persons are estimated to smoke marihuana on a regular basis (21), and this is undoubtedly a conservative figure. Heroin abuse, while still small in comparison to legally prescribed agents, nonetheless several years ago was considered the leading single cause of death of young men in New York City between the ages of 15 and 35. Recent estimates released by the Drug Enforcement Administration reveal the number of heroin users nationally at the end of 1974 to be 724,000—an increase from 612,000 the year before. This represents the greatest increase in a single year since figures have been kept (17).

Prevalence of Psychotropic Drug Use Among Women

The prevalence of psychotropic drug use among women has always been higher than among men, approximating two times that for each class of psychotropic drug and for any given psychotropic agent (26). This higher prevalence of drug use by women, which has been confirmed in studies dealing with psychotropic drug use in other countries (3), has been attributed to: a) a greater likelihood of a woman visiting a physician; b) excessive demands characterizing female social roles; and c) less use of alternative substances, such as alcohol, in coping with emotional stress (27). Whether any or all of these factors play a role is unclear; however, such drug use does exist and is significant.

The findings of the New York State Drug Abuse Control Commission are illustrative of the problem. A study by the Commission in 1970 of regular users of nonopiate drugs, excluding marihuana, revealed that: a) those using legal drugs obtained without legal prescriptions were approximately 10 times as numerous as those using illicit narcotics; and b) about 45 percent of the soft-drug users were less than 35 years of age, and women comprised 60 percent to 65 percent of the entire soft-drug using population (24). Using these figures, Carr has estimated that approximately 400,000 women in New York City of childbearing age may be using nonnarcotic agents without appropriate prescriptions. This represents approximately 5.4 percent of the total population of New York City (9).

Psychotropic Drug Use in Pregnancy

Drug consumption *during pregnancy* is still considerable, although not usually recommended by physicians unless specifically warranted. Fofar and Nelson (12), in a retrospective review of 911 randomly selected mothers, found 82 percent to be taking prescribed medications, excluding iron supplements. The average number of prescribed drugs per woman was four. In addition, self medication was also reported by 65 percent of respondents. The most frequent reason for drug consumption was the relief of anxiety or analgesia. Hill (16), in a prospective study using gas chromatography of urine to assess the number of drugs ingested by 156 women during their pregnancy, found that 64 percent took an analgesic agent, 24 percent used a sedative, and 5 percent used a narcotic at some time during gestation. Interestingly, all of these women came from a middle to high socioeconomic group.

Similar findings among a smaller population of women from a somewhat lower socioeconomic level were reported by Jacoby (18). In this series of 86 pregnant women who were not known to be taking mood-altering agents, thin layer chromatography of the urine revealed the presence of barbiturates, salicylates, or quinine in 19 (22 percent). Further, these results showed: 17 patients (20 percent) had barbiturates or salicylates, either singularly or in combination; 9 women (10 percent) had only barbiturates; and 3 patients had quinine associated with either salicylates or barbiturates.

Polydrug Abuse

In light of the above discussion, it becomes quite important not only to review the effects that mood-altering drugs might have upon

pregnancy and delivery but also to emphasize the need for carefully defining the extent and type of drug abuse in the pregnant woman.

Increasing attention is being focused upon infants born to narcotic-dependent mothers, with specific emphasis being placed upon women maintained on methadone. This concern is understandable considering the large number of persons currently enrolled in methadone programs. In New York City, approximately 33,000 persons are registered with methadone maintenance programs, approximately 25 percent of whom are women of childbearing age (25). Recent reports on the effects of methadone on the neonate have been quite controversial, with considerable disagreement among different investigators. Methadone is considered to range from being relatively innocuous to being the cause of serious, prolonged withdrawal symptoms, and is even implicated in sudden infant death syndrome (5,13,25,28,30,32,34,37). With few exceptions, most of these published studies relate to small, poorly delineated populations with the absence of adequate control groups and may indicate the presence of multiple drug abuse more than ill effects due to methadone. (See chapter V.)

Alcohol and agents from the tranquilizer group are a frequent combination in multiple drug use. Data obtained from the Drug Abuse Warning Network (DAWN), established by the Drug Enforcement Agency and the National Institute on Drug Abuse, reveal over 192,000 nationally reported episodes of drug abuse in 1974. Diazepam (Valium) and alcohol in combination with other drugs rank first and second in types of drugs reported. Ten percent and eight percent, respectively, of all drugs abused appeared in these two categories (29). In a recent study of 100 pregnant adolescents of low socioeconomic status at entry into prenatal care, 3 percent were using either heroin or methadone, 8 percent were using barbiturates or other depressants, and 10 percent were smoking marihuana. Perhaps of even greater significance, 50 percent were cigarette smokers and 25 percent drank alcoholic beverages (36).

Polydrug Abuse and Narcotic Dependency

Polydrug abuse may be classified into four main types: a) narcotic abuse or dependency associated with abuse of other psychotropic drugs including alcohol; b) methadone maintenance associated with abuse of other psychotropic drugs including alcohol; c) alcohol abuse associated with other psychotropic agents excluding narcotics; and d) nonnarcotic psychotropic drug abuse excluding alcohol (19).

Polydrug abuse in the heroin addict is a frequent phenomenon. This is expected, since agents in the alcohol-tranquilizer group are freely interchangeable and, when combined with narcotics, may provide synergistic mood-altering effects. Although the development and expansion of methadone maintenance programs have begun to emphasize this problem, much evidence exists that heroin addicts have long been abusing other drugs both prior to and during addiction to heroin and long before initiating methadone maintenance. Prevalence figures for alcohol use among heroin addicts have ranged from 30 to 80 percent (7,33,35). In fact, alcohol has been found to be the most frequent "drug" of abuse prior to initiation of heroin dependency. Similarly, barbiturate-tranquilizer use has been reported to predate narcotic use in up to 20 percent of persons and to coexist in up to 80 percent of narcotic addicts with an actual physical dependence being present in as many as 25 percent (10, 20,31).

Stimulant abuse has been relatively infrequent in heroin addicts, unless heroin is injected to obtain a better high. Recently, however, a study in Washington, D.C., revealed that 48 percent of heroin addicts had been abusing the stimulant phenmetrazine (Preludin) (14). The use of major hallucinogens by heroin addicts, although not frequent, has been shown to have generally increased over the past several years (8).

Abuse of multiple drugs is more prevalent in younger people—thus, among women during the childbearing years. Depending upon the type of drug, frequency of use, and presence of actual physical dependence, multiple drug use during pregnancy may have markedly adverse fetal effects. Knowledge of the specific effect of such drugs is essential to provide optimal management of the drug-dependent woman during the pre-, intra-, and post-partum periods. The actions of mood-altering drugs on both adult and fetus, the diagnoses of drug dependency and drug misuse, and the treatment of both mother and baby will be discussed in subsequent chapters.

PHARMACOLOGIC CLASSIFICATION OF PSYCHOTROPIC AGENTS

General Classification

Drugs with a significant abuse liability all reside in the category of agents active on the central nervous system (CNS) (table 1). It is convenient to classify CNS drugs into two primary categories:

a) those that exhibit generalized inhibitory effects, and b) those whose effects are localized to specific brain areas. Drugs having generalized effects on the CNS can be further divided into depressants and stimulants. These categories are generally used to designate the predominant effect of a drug at conventional therapeutic dosage levels. Some depressants, e.g., barbiturates, produce a generalized depression of the nervous system, whereas others, e.g., phenothiazine and tranquilizers, depress primarily the limbic system which is believed to control emotional functions. This is an important distinguishing feature in that general CNS depressants carry a strong risk of depressing breathing centers, whereas this is an unlikely side effect of major tranquilizers.

Hallucinogens produce gross distortions of thought and sensory processes and thereby induce a psychosis-like state.

Opioids, agents which bind to specific receptors in certain brain areas, can be either agonists, antagonists, or mixtures of the two. Agonists, e.g., morphine and methadone, exert opioid effects such as analgesia, euphoria, depression of breathing, and physical dependence. Antagonists, e.g., naloxone, block the effects of the agonists but have little or no pharmacologic effects alone. Mixed agents, e.g. nalorphine and pentazocine, act as agonists if no other agonist is present but as antagonists in the presence of another agonist.

Dependence, Tolerance and Abstinence

Dependence and Addiction

Dependence is an adaptive state characterized by behavioral and other physiological responses including: a) a compulsion to continually take a drug to experience its pleasurable effects or to prevent withdrawal; and b) the appearance of disturbances, either psychological and/or physiological, when administration of the drug is suspended. In the sociological context, addiction is characterized primarily as compulsive drug-seeking behavior which may or may not involve tolerance and dependence. It is important to appreciate this distinction since patients being treated with opioids for temporary pain may develop tolerance and dependence, but rarely continue seeking such drugs after the pain episode abates. Likewise, the neonate undergoing withdrawal from physical dependence induced in utero is not an addict.

Tolerance

Tolerance is a reduction in responsiveness to a drug. Tolerance can be manifested as an increase in the dose required to produce an effect or a decrease in magnitude of effect at a given dose level. It can be congenital or can be acquired by prior recent use of the drug or other drugs. Acquired tolerance results from adaptive changes in what the body does to the drug (dispositional tolerance) or in what the drug does to the brain or other organs where specific drug action occurs (target site tolerance). Dispositional tolerance is usually the result of an increased capacity of liver enzymes to metabolize (chemically change) the drug into inactive metabolites. Since only a few such enzymes metabolize most drugs, when dispositional tolerance is induced by one drug, it often carries over to other drugs and other classes of drugs (cross tolerance). While this type of tolerance develops in a few days, it is of limited magnitude and usually accounts for a maximum of 2-4 fold change in drug responsiveness. It is also completely and rapidly reversible. Moreover, dispositional tolerance, which has its origin outside of the brain, is not directly involved in physiological addiction.

Tolerance associated with the addictive state develops after repeated exposure to a drug over a period of a few weeks to many months. This target site tolerance occurs in the brain and has crossover limited to a given drug class. For example, tolerance to alcohol is associated with tolerance to barbiturates but not to opioids. Target site tolerance may develop to some but not all effects of a drug, and it may develop at different rates for various effects of a drug. For example, tolerance to respiratory depressant effects of opioids develops more slowly than tolerance to their euphoriant effects, thus increasing the risk of mortality in the addict who continues to escalate dosage in order to get "high." The magnitude and rate of development of tolerance depend on the drug, the frequency and magnitude of exposure, and the route of administration.

If dosage is increased to compensate for this phenomenon, the level of tolerance will also increase to adapt to the new dose level. Continued dosage increase (either in amount or frequency or both) is accompanied by continued development of tolerance. The magnitude of target site tolerance can be very large for certain drugs. For example, many heroin addicts have reportedly tolerated as much as 400 mg of the drug, 100 times the analgesic dose and 10 times the lethal dose for a nontolerant person.

Physical Dependence

Physical dependence is said to exist to a drug if, after repeated prolonged exposure at escalating dosage, an abrupt discontinuation of the drug is followed by a predictable sequence of physical signs and symptoms (withdrawal syndrome). It is one of the factors that promotes continued drug use in an addict, as these symptoms are aversive, making the addict feel sick. The magnitude of severity of symptoms depends upon the level of tolerance (i.e., tolerated dosage) and abruptness of discontinuation of the drug.

There are qualitative differences in the withdrawal syndromes of the various drug groups. In general, the withdrawal effects are the opposite of the drug effects. For example, opioids cause euphoria and a prominent withdrawal effect is dysphoria (unpleasant feelings). Similarly, there are opioid effects on the gastrointestinal tract which result in constipation, while diarrhea often occurs during the withdrawal phase in the addict. Barbiturates depress motor nerves and have anticonvulsant effects, but barbiturate withdrawal may be complicated by convulsions. Motor functions are not prominently depressed by opioids and predictably, then, convulsions are uncommon during opioid withdrawal. However, convulsions occur more commonly in the setting of opioid withdrawal in areas of the world where large doses of opiates are used (such as in Asia and in the Middle East).

The interrelation between target site tolerance and physical dependence is explained by regarding tolerance as a homeostatic adaptation of nerve cells to the continued presence of a drug and the withdrawal syndrome as the result of abruptly unmasking the adaptive change. The exact biochemical mechanism of the tolerant-dependent state is unknown.

Repeated use of any general depressant of the central nervous system or any opioid agonist will result in the tolerant-dependent state. The only differences will be in the rate of development of tolerance, and in the symptoms of withdrawal.

Detoxification

Detoxification is the process of slowly decreasing the dose of the addicting drug or cross-tolerant substitute drug until a drug-free state is attained. This permits the return of tolerant nerve cells to the nontolerant state without the occurrence of the withdrawal syndrome. This is the basis for methadone detoxification of heroin addicts. In contrast, the administration of an opioid antagonist (e.g., naloxone) will precipitate an abrupt and more severe withdrawal

syndrome. Withdrawal has inadvertently been precipitated in opioid addicts when given pentazocine (Talwin), a mixed narcotic agonist and antagonist, for relief of pain. Opioid antagonists and partial agonists should be avoided in pregnant women and in the delivery room with depressed neonates who are physically dependent on opioids because of the risk of adverse withdrawal effects on the fetus or neonate.

Maintenance therapy of opioid addicts with methadone maintains the tolerant-dependent state with negligible pharmacologic effects or withdrawal symptoms if a constant dose is taken at regular intervals, usually once a day. Cross tolerance, prevents the addict from experiencing the euphoriant effects of heroin and other opioids, at least at the dose levels currently available to addicts through illicit sources. It should be realized that this so-called "blocking" effect depends on the relative doses of methadone and heroin and the cross tolerance does not extend to drugs other than opioids.

The fetal brain also develops tolerance and dependence to drugs in much the same manner as the maternal brain. Consequently, if the mother is dependent, the fetus is also dependent and, if the mother experiences a withdrawal syndrome, so will the fetus. Since fetal withdrawal in utero carries a high risk of morbidity and mortality, it is important to prevent its occurrence through either careful and slow agonist detoxification or maintenance therapy. If the newborn is physically dependent, it will experience the withdrawal syndrome soon after being separated from the maternally derived drug(s). The severity of neonatal withdrawal also depends on the level of tolerance. It can be treated in a manner analogous to detoxification of the drug-dependent adult by initially administering a sufficient dose of a drug with cross tolerance and then slowly tapering the dose regimen. The use of drugs that do not have cross tolerance, e.g., barbiturates for opioid dependence, has no more rationale for the newborn than for the adult. This is discussed in greater detail in chapter V.

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CHAPTER II

Pharmacologic Effects on Mother and Infant

PHARMACOLOGIC UNIQUENESS OF THE FEMALE

Since women of childbearing potential are often excluded from clinical studies involving drugs, objective scientific information on drug effects in women is lacking. Consequently our knowledge of the unique aspects of drug action in females is most often limited to uncontrolled studies and anecdotal reports from the clinical literature supplemented by animal studies. Although this deficiency needs to be recognized, in general, the effects of psychoactive drugs do not differ greatly between women and men. However, since a woman's infants will eventually develop from ova which are present in her ovaries from the beginning of her own embryonic life, we must be concerned about the possible mutagenic (gene toxic) effects of drugs on future offspring. Mutagenic effects carry a risk for infertility and cancer (16). In addition, there is concern for the effects of drugs on the fetus if taken by the mother during pregnancy. While congenital abnormalities occur primarily during early pregnancy, some drugs also have the potential to affect the growth of the fetus and its postnatal behavioral and mental performance when exposure occurs at later stages of pregnancy (44). Even after delivery, maternally ingested drugs can gain entrance to the neonate through the mother's milk.

Because of the potential significance of these drug effects on reproducing women and the paucity of our knowledge in this area, medical experts often recommend that drugs be contraindicated throughout pregnancy and during the nursing period. While such a conservative view has its place in arguments against casual experimentation with drugs, there are instances when this approach can lead to undertreatment and mismanagement of disease in women. It is clear that physically and mentally healthy women are far more likely to produce healthy babies and that inadequately managed maternal disease, including drug addiction, is associated with an increased risk of obstetrical and neonatal complications.

Although females generally respond to drugs in a manner similar to males, there are important differences which are only beginning to be understood. Studies in animals have shown that females metabolize some drugs more slowly than males and thus exhibit more intense and longer lasting effects than males do (16). This gender difference does not appear to be important in humans primarily because other individual differences in rates of drug metabolism obscure the sex-related effects.

Oral contraceptives have been shown to cause a decrease in metabolism of certain drugs in women, suggesting the possibility of drug interactions (9). Epileptic women often have seizures coincident with menstruation. The blood loss of menstruation increases the female iron requirement and can lead to anemia if not adequately replaced.

Pregnancy involves many physiologic changes, including alterations in renal function and changes in blood flow to various organs. There is increasing evidence that the elimination of certain drugs is altered during pregnancy but a general trend is not apparent. There is variability in elimination rate that is dependent upon the individual and the particular drug. Consequently, the development of pregnancy in women being treated with drugs requires a closer evaluation of the appropriateness of the dosage regimen.

FETAL EFFECTS OF DRUGS DURING PREGNANCY

Transplacental Passage of Drugs

Congenital birth defects are inducible primarily during the first trimester of pregnancy (46). Therefore, one must consider maternal to fetal transports both before and after the placental unit becomes functional. During the first few weeks of pregnancy the placenta has not yet become the primary site of maternal-fetal exchange. During this period the fetus acquires nutritional factors and drugs from surrounding maternal fluids. This is the time at which the fetus is particularly vulnerable to drugs administered by the vaginal route, as these may attain high local concentrations within uterine and tubal fluids.

It is a commonly held misconception that the placenta protects the fetus from maternally ingested drugs by preventing their transport to the fetus. Any drug which has psychopharmacologic effects must obviously diffuse into the brain, which has high membrane permeability requirements, and it follows then that this drug also

crosses the placenta, which has lower permeability requirements than the brain. Further, once across the placenta, these psychoactive drugs distribute into the fetus and fetal brain. Actually, any drug which can cross the gastrointestinal barrier (i.e., has some pharmacologic activity after oral ingestion) can also cross the placenta at least to some extent, because the cellular barrier in both locations has similar permeability characteristics.

There are very few examples of drugs which do not cross the placenta and can therefore be given to the mother without any possibility of directly affecting the fetus. One example is the anticoagulant heparin. Heparin is a large molecule that interferes with the clotting mechanism and can be used to prevent clot formation, particularly in association with artificial heart valves. It follows the oral absorption rule in that it has no effect after oral administration and must be given intravenously. On the other hand, there are orally effective anticoagulants, such as warfarin, that *do* cross the placenta and will affect the clotting status of the fetus. These drugs are therefore contraindicated in pregnancy, particularly near term.

Because there are some anatomical differences in the fetal cardiopulmonary circulation, which acts like two parallel pumping systems instead of the sequential system found postnatally, it requires 30 minutes or more for a drug to distribute equally throughout the fetus and to come into equilibrium with the mother, assuming that the maternal level remains constant during this time. Therefore, it is appropriate to speak of a "time barrier," if the residence time of drug in the mother is short or if the baby is delivered soon after administration of the drug to the mother. This is the reason that babies can be delivered by cesarean section from anesthetized mothers without exhibiting significant signs of central nervous system depression. In this instance, it is essential that the period of time between anesthesia of the mother and delivery of the infant be kept short, usually less than 15 minutes.

In summary, it should be realized that repeated use of a psychoactive drug by a pregnant woman will result in accumulation of that drug in the fetus to levels that are at least as high as those achieved in the mother. Whether or not the drug will have adverse effects on the fetus depends in part on the size and frequency of doses taken by the mother.

Fetal Toxicity

The fetus is almost always an unintended recipient of drugs taken by its mother. The type and severity of adverse effects of a given

drug on the fetus depend on a multitude of factors, including the size and frequency of dose, the route of administration, the state of pregnancy, maternal health and nutritional status, genetic makeup of the mother and fetus, previous obstetrical history, and a myriad of environmental factors—including concomitant exposure to other drugs, smoking status, and perhaps even environmental pollutants. When one considers these many variables and also the difficulty in obtaining a meaningful drug history from a given patient, along with the widespread adulteration and misbranding of "street drugs," it should not be surprising to realize the impossibility of compiling a list of teratogenic (birth defect producing) drugs of abuse.

Testing of drugs in pregnant animals has been accepted by the Food and Drug Administration (FDA) as the best means of estimating human teratogenic potential. A review of scientific reports of such studies (16), however, leaves the impression that virtually any drug will have adverse effects on fetal growth and development if sufficient dosage is administered to the mother. Fortunately, there is growing recognition of this problem and a tendency to use dose levels that are relevant to the human situation. However, even if properly designed studies show no evidence of teratogenic effects in multiple animal species, there can be no assurance that humans will be similarly unaffected. One needs only to recollect that thalidomide produced its greatest teratogenic effect in humans. Monkeys and rabbits were far less sensitive, and the mouse and rat essentially insensitive (16).

Birth defects occur in 2 or 3 of every 100 live-born babies in the United States and in only one-third of these cases is the cause recognized. Whether or not drugs—and in particular drugs of abuse—are responsible for any of these birth defects remains problematical and causes considerable concern for this potentially devastating consequence of drug usage. For example, drug product manufacturers are required by FDA to include warnings about potential teratogenic effects of drugs ever though there is no clear documentation regarding the presence or absence of such effects. Moreover, the warning statements generally use the phrase "women of childbearing potential" instead of "pregnant women." This choice of words is predicated on the realization that most women are unaware of their gravid state until the fetus is well into the susceptible stage of pregnancy.

Period of Teratogen Sensitivity

The period of teratogen sensitivity begins approximately 20 days after conception and continues for another 2 months, until approx-

imately the 80th day of gestation. Stated in the usual manner of dating pregnancy clinically, the sensitive period begins approximately 30 days after the last menstrual period (LMP) and continues through the end of the third month. Because this method assumes that ovulation is occurring regularly every 28 days at the midpoint between two menstrual periods, and since many women have their periods irregularly, the degree of uncertainty with this procedure needs to be recognized. It may be useful to remember that when a cycle lasts longer than 28 days, the extra time is prior to ovulation and the time between ovulation and the next menses remains relatively constant at 14 days.

The lack of teratogen sensitivity prior to the completion of the first month of pregnancy is thought to be related to the existence of only undifferentiated and totipotential cells in the embryo at this time. It is reasoned that if a few such cells are lost, there could be a few others to replace their genetic role. However, if more than a critical number are killed, the embryo will die (46). Thus, drug effects during the first month tend to behave as all-or-none phenomena (46). Once the embryoblast begins to evolve tissues and organs, beginning at approximately 20 days after conception, drug effects can produce permanent changes in the anatomical development of the fetus. It appears that the type of change, i.e., the defective organ, is determined at least in part by the stage of development existing at the time of drug exposure.

Growth Retardation

After the completion of organ and skeletal development, the fetus is no longer susceptible to gross anatomical defects (dysmorphogenesis). It does, however, remain vulnerable to growth retardation and a variety of functional and behavioral abnormalities. For example, cigarette smoking carries a high risk (approximately 30 percent) of a baby which is small for gestational age, as does addiction to heroin (19). Maternal use of aspirin (11), oral anticoagulants (20), or anticonvulsant drugs (3,34), especially in the last trimester, can result in bleeding problems in the newborn.

Specific Pharmacologic Effects

Drugs that promote contractions of the uterus can have indirect adverse effects on the fetus by causing labor to begin earlier than the normal 38-40th weeks of gestation. Prematurely delivered infants are at an increased risk of breathing difficulties, brain hemor-

rhage, and mental deficiency. The ergot alkaloids (ergotamine and ergonovine) are potent uterine stimulants and may be unwittingly taken by pregnant women for treating migraine headaches (Cafergot contains ergotamine).

Aspirin and similar drugs that block the synthesis of prostaglandins (potent mediators of uterine contractions) can delay the onset of labor and prolong its course (10). There is also evidence in animals that these drugs could cause closure of the ductus arteriosus, the fetal blood vessel which shunts blood around the nonfunctional lung until shortly after birth (42). Closure of this opening in utero results in cardiac failure.

Effective ventilation of the lungs (breathing) is the most important requirement for the fetus in making its transition to the extrauterine environment. Any factor which impedes the onset of regular and adequate spontaneous breathing movements by the newborn infant carries potential for hypoxic brain damage.

There is some concern that either continuous or intermittent use of depressant drugs during pregnancy may be associated with mental changes in the baby (26). While there is little direct evidence for this, it is known that prolonged apnea (cessation of breathing) in the first few minutes after delivery is associated with behavioral and intellectual deficiencies, a relationship which suggests conservatism in the use of depressants in the perinatal period (7). The opioid drugs are depressants of breathing in babies as well as in adults. Morphine appears to be particularly effective at depressing breathing in the neonate (45). A possible explanation for this is that the newborn has an immature blood-brain barrier for drugs which later matures to impede the passage of water-soluble drugs into the brain. Thus, when morphine, a relatively water-soluble opioid, is given to a mother, it will achieve a higher level in the fetal brain than in the maternal brain (33). This differential brain permeability appears to be less important for more fat-soluble opioids, such as meperidine (Demerol) and methadone. The fact that infants of mothers who are chronic users of narcotics do not have an unusually high incidence of respiratory depression at birth is probably related to the development of target site tolerance in the drug-dependent fetus.

DISPOSITION OF FREQUENTLY USED AND ABUSED DRUGS IN THE MATERNAL-FETAL UNIT AND NEONATE

A limited number of studies have been carried out on the disposition in the maternal-fetal unit and neonate of drugs which are

commonly used and abused by heroin addicts and methadone-maintained women.

Diazepam

The distribution and effects of diazepam in the maternal-fetal unit and neonate have been studied in women who were given this drug during pregnancy for a variety of indications and who were neither dependent upon narcotics nor abusing other drugs (12,13, 15,17,25). Indications for diazepam use during pregnancy have included use as a tranquilizer, for management of threatened abortion, and for treatment of preeclampsia, or eclampsia, and as a relaxant during active labor and delivery. Studies have shown that diazepam transfers across the placenta both in early and late pregnancy and that it accumulates in fetal tissues in high concentrations (12,13,15,17,25). It has also been shown that after chronic low to medium dose (10-15 mg/d) treatment in the pregnant woman, concentrations of diazepam and its active metabolites in the infant's plasma are high enough to sustain pharmacological action for at least 8 to 10 days after birth (15,17,25). Symptoms in the neonate may include lethargy, respiratory difficulties including apneic spells, disturbances in thermoregulation, hypotonia, and failure to suck effectively (12,25). The acute administration of more than 30 mg of diazepam quickly during labor within 15 hours before delivery also may result in adverse clinical effects on the neonate sustained by prolonged pharmacologically active concentrations of drug and metabolites in plasma (12).

Barbiturates and Tranquilizers

Studies of the effects of barbiturates on the human maternal-fetal unit and neonate have similarly shown that infants born of mothers receiving chronic barbiturate treatment during pregnancy may have perinatal symptoms of withdrawal, including tremulousness, restlessness, persistent high-pitched cry, sleeplessness, hyperreflexia, and occasional convulsions (2,13). In some cases, symptoms first appeared at birth; more frequently, symptoms did not appear until 4 to 7 days after birth, and, in some cases, recurred for several weeks up to age 6 months. Such prolonged and severe withdrawal symptoms were observed in some infants born to mothers taking doses of phenobarbital as low as 90-100 mg daily before delivery for various medical indications. In another study,

it has been documented that the plasma half-life of amobarbital, which may be given to pregnant females for mild hypertension, was 2.5 times as long in the newborn as in the mother (27).

Both tranquilizers and barbiturates may cause symptoms in the neonate that may mimic or even be more severe and prolonged than those due to withdrawal from narcotics (12,13,15,17,25). Since these agents are commonly used and abused by women taking or receiving narcotics on a chronic basis, it is important that maternal and neonatal urines be closely monitored for these agents. Maternal assessments should be made during pregnancy, when possible, and always at the time of labor and delivery. Unfortunately, analyses for tranquilizers are usually not a part of routine screening; they should be included. Careful drug history taking also should be carried out routinely. Such measures are essential for appropriate management of the mother and child. Useful schedules of detoxification from barbiturates during pregnancy have been published and similar schedules for detoxification from tranquilizers during pregnancy are needed (6).

Alcohol

Alcohol abuse is a major problem in both heroin addicts and methadone maintenance patients (29), and alcoholics commonly use other drugs of abuse. Alcoholic beverages contain many chemicals (congeners and aldehydes) in addition to ethanol. At present, little is known about the disposition of alcohol in the human maternal-fetal unit, or about the possibly more subtle effects of maternal chronic excessive alcohol abuse on the fetus and neonate (23,24). An overall increase in the incidence of congenital abnormalities has recently been described in infants born to heavy drinkers (36). The term "fetal alcohol syndrome" has been applied to a pattern of abnormal features of the face, low I.Q., and prenatal and postnatal growth retardation. This syndrome, not included under present categories of congenital defects, is suggestive of adverse fetal outcome and indicates a need for investigation of covert abnormalities. For example, malnutrition, including folate deficiency, is a common feature of alcoholism. It is of interest that anticonvulsant hydantoin drug use during pregnancy has been shown to be associated with a fetal syndrome having remarkable similarity to the fetal alcohol syndrome (18). Curiously, these drugs also lower folate levels in some patients (22).

Nicotine

Smoking is almost universal amongst heroin addicts and methadone maintenance patients. Several studies have suggested that chronic smoking is associated with relatively low birth weight infants (8).

All of these factors of possible adverse effects on the fetus and neonate must be considered in planning the management of any pregnant patient—especially of the narcotic-dependent patient in whom detoxification from narcotics may cause increased use of an alternative agent.

METHADONE DISPOSITION IN THE PREGNANT WOMAN AND NEONATE

Morphine, the major metabolite of heroin, and methadone both readily cross the placenta, and methadone may be identified and measured in amniotic fluid, cord blood, and neonatal urine (5,38, 41,47). Metabolism of narcotics may be altered during pregnancy by the effects of the hormonal milieu on drug metabolism in general. Very little is known about the effects of this altered hormonal state of pregnancy on drug metabolism in the human female, although in animal and in in vitro studies it has been shown that estrogens may inhibit microsomal enzyme metabolism of several drugs, including narcotics, and that growth hormone, which is elevated during pregnancy, may also alter activity of microsomal drug-metabolizing enzymes (1,35,37). The role of the human placenta and human fetal liver in narcotic metabolism in vivo remains unexplained. Similarly, the effects of other drugs, used or abused during pregnancy, on narcotic metabolism are unknown.

Methadone is widely distributed throughout the body after oral ingestion, so that less than 6 percent is in the total blood volume at the time of peak plasma levels (21,28,43). It is metabolized primarily by the liver and excreted both as unchanged methadone and a variety of metabolites in urine and in feces (21,28,30,31,43). There is extensive nonspecific tissue binding of methadone, which creates reservoirs that can release unchanged methadone back into the blood, thus contributing to its long duration of action (14). After ingestion of a maintenance dose of methadone in patients with no polydrug abuse, peak plasma levels occur between 2 and 6 hours after the oral dose and plasma concentrations rarely exceed 1

microgram per milliliter. Lower sustained plasma concentrations are present during the remainder of the 24-hour period (28).

Plasma levels of pregnant methadone maintenance patients have been determined at the time of labor and delivery in 37 patients included in two studies (29) and on repeated occasions during late pregnancy in a single patient in one study (5,32,39,40). The mean dose of methadone at the time of delivery in one study was approximately 80 mg. per day and in a second study approximately 35 mg. per day (5,39,40). Blood was drawn at the time of delivery with no fixed or documented relationship to time of last dose of methadone. In the first study, the random mean plasma level of methadone was 0.18 ± 0.3 μg/ml and in the second, 0.16 ± 0.04 μg/ml (5,39,40). Pronounced inter-individual variation in methadone disposition and resultant plasma levels and possible differences in analytical techniques used may account for the similar plasma levels in patients with vastly different mean daily doses of methadone. In the study of one patient in whom determinations of sequential plasma levels of methadone following an oral dose of methadone were carried out twice during pregnancy and three times during the post-partum period, it appeared that the plasma levels were somewhat lower after a given dose during pregnancy than following delivery, suggesting that there may be increases in fluid space or tissue reservoirs for storing methadone or altered drug metabolism during late pregnancy (32). More studies of methadone disposition in maintenance patients during pregnancy are urgently needed at this time.

Amniotic fluid and cord blood levels of methadone have been measured in two sets of studies of 1 and 18 patients respectively, studied at the time of amniocentesis in mid-pregnancy or at the time of delivery (4,5,32). In the first study, the presence of the two major N-demethylated metabolites of methadone (pyrrolidine and pyrroline) were identified in amniotic fluid along with unchanged methadone; the concentrations of methadone in amniotic fluid were significant (0.66 μg/ml) at the time when the cord blood levels were below the lower limits of detection (<0.01 μg/ml) following a dose reduction from 110 mg. to 9 mg. a day over 37 days (32). In the second set of studies, the concentrations of methadone in amniotic fluid ranged from 0.07 to 0.45 μg/ml in patients maintained on 30 to 100 mg. of methadone per day (4). In patients studied at the time of delivery, the mean ratio of amniotic fluid to maternal plasma levels of methadone was 0.73 μg/ml and the mean ratio of cord blood to maternal plasma levels of methadone was 0.57 μg/ml (5). In a third study, the ratio of cord blood to maternal plasma levels of methadone was 0.50 μg/ml (39).

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CHAPTER III

Clinical Management During Pregnancy

INTRODUCTION

Sixty to ninety percent of women dependent upon heroin have menstrual abnormalities, with amenorrhea being most frequently reported (11,15,24,28). Polydrug abuse may also accentuate menstrual irregularities (1). Other frequent contributory factors in menstrual problems of the narcotic addict are malnutrition, hepatitis, pelvic infection, and other physical illnesses, as well as the stress of the unstable social, economic, and emotional environment in which the woman is involved.

Women taking legally prescribed narcotics for underlying medical conditions and those enrolled in methadone maintenance programs usually do not have difficulty with their menstrual cycle (11). Similarly, discontinuation of illicit heroin with subsequent abstinence is associated with a return to menstrual regularity in 57 to 88 percent of women (18,19). Many reports of a high incidence of amenorrhea in women on methadone maintenance have been based on histories obtained from women during the first 3-6 months of methadone maintenance treatment. In most patients receiving chronic methadone maintenance treatment for heroin addiction, menses become normal during the first 6 months of treatment. Eighty to 93 percent of women on chronic high dose methadone maintenance treatment have reported a return of normal menstrual cycles during the first 6-12 months of treatment (24,31), but in a few patients up to 2 years were required for menses to return to normal (2,11,18,19,24, 31). During methadone maintenance treatment, contraception therefore is necessary to avoid unwanted pregnancies. When pregnancy is desired, it is usually possible in those patients whose menstrual cycles have returned to normal.

Fertility is difficult to assess in any population and especially in heroin addicts, since proper prospective studies cannot be carried out because of difficulties in identification and maintenance of this population. A comparison of the reported high frequency of sexual

activity with the number of known pregnancies and births in this population has led to the impression that fertility is diminished. In one retrospective study, 61 percent of active heroin users were considered infertile. Despite the fact that all 100 former female heroin addicts interviewed had frequent sexual exposure without contraceptives while using heroin, only 39 became pregnant during this period (2,17). This may be compared to an estimated prevalence of infertility of 13 percent in nonaddicted women.

It must be emphasized, however, that although anovulatory cycles are frequent, pregnancy may indeed occur. The need for family planning and dissemination of birth control information is therefore apparent. Once a narcotic addict becomes pregnant, the course of the pregnancy may not be smooth. Increased risk exists for abortion, birth of premature infants, intrauterine fetal distress, and narcotic withdrawal in the neonatal period. It therefore becomes quite important to diagnose pregnancy in the narcotic addict as early as possible, so that adequate medical and psychological care can be instituted.

DIAGNOSIS OF PREGNANCY

The three most common indicators of pregnancy are: a) a history of amenorrhea; b) a positive pregnancy test; and c) palpation of the gravid uterus. Unfortunately, none of these indicators is reliable in the addict. Amenorrhea as discussed above is frequent. In addition, the early signs or symptoms of pregnancy, such as fatigue, headaches, nausea and vomiting, hot sweats, or pelvic cramps, may be interpreted as withdrawal symptoms by both physician and patient. Not infrequently, the onset of these symptoms compels the drug addict to seek more drugs which are not only ineffective in alleviating her symptoms, but also expose the fetus to increased risk secondary to changing serum levels of narcotics and other drugs.

Present-day diagnostic tests, such as Pregnosis or Pregnosticon, may give a false-positive reaction in 5 percent of woman addicts secondary to the direct effects of the heroin. False-positive pregnancy tests may also be obtained from methadone-maintained patients when specific types of tests are used. In one series of over 500 pregnancy tests in women maintained on methadone, 24 percent of the results were false-positive when the Gravindex slide test was used and 5 percent false-positive when the Pregnosticon slide test was used (18a). However, there was less than a 0.2 percent incidence of false-positive results when the 2-hour Pregnosticon or UCG tube tests were used. It is postulated that the false-positive tests are due to an in vitro effect of methadone metabolites which apparently

interfere with the inhibition of latex particle agglutination in the slide tests (18).

For several reasons, it may be extremely difficult on bimanual pelvic examination to palpate an early intrauterine pregnancy in these patients. The generally poor physician-addict interrelationship tends to make these women quite uncooperative while undergoing a pelvic examination. Further, the presence of an acute, subacute, or chronic pelvic infection may result in discomfort during examination and obscure the physical findings, thus making determination of pregnancy and assessment of gestational age difficult.

The single most reliable aid for diagnosis of pregnancy and fetal age is ultrasonography, a noninvasive technique that has a high safety factor for both the mother and fetus (26). Normal early intrauterine pregnancy may be readily diagnosed with this method at 5 to 6 weeks after the last normal menstrual period or 3 weeks post-conception.

The patient who presents herself before the 12th week of gestation is given the option of voluntary interruption of pregnancy. Although few patients may elect this procedure, mandatory abortion in a heroin-dependent woman or a methadone-maintained patient should never be advocated. These patients need all the assurance and support that can be provided to overcome their problems; to urge abortion against the patients' wishes is certainly not part of that support.

DIAGNOSIS OF NARCOTIC ADDICTION

The diagnosis of heroin dependency based on history and physical examination in the pregnant woman is quite similar to that in a nonpregnant heroin addict. The presence of pupillary constriction, dermatologic signs of illicit injection such as "track marks," thrombotic veins, subcutaneous abscesses or nodules, and localized edema over superficial veins are all suggestive of addiction. Lymphadenopathy and hepatomegaly may be quite pronounced in parenteral drug users. The possibility of illicit injections must be considered when lymphadenopathy is unilaterally detected.

There are several features associated with previous pregnancies that should be noted: i.e., a past history of low birth weight infants or excessive fetal activity. An increase in fetal activity may be observed when unstable serum levels of narcotics occur secondary to irregular or changing heroin doses.

It should be emphasized that the administration of narcotic antagonists to diagnose heroin dependency in pregnancy is contraindi-

cated. The inducing of even mild withdrawal in pregnancy may result in severe adverse fetal effects. The most definitive method of diagnosing heroin or polydrug abuse is by analysis of urine specimens.

Thin Layer Chromatography (TLC)

TLC is a practical, economical, and sensitive method for detection of drugs in urine specimens (table 1). TLC can be routinely performed with as little as 50 cc's of urine, which may be extracted with the use of cation exchange paper at the site of collection, thereby eliminating the need to transport large numbers of urine specimens to a central laboratory. For identification of substances with this method, drug use must have occurred within 8-24 hours (depending on the drug used) prior to collection of the urine sample and the dose must provide sufficient concentration for detection.

TABLE 1. Drugs detectable with thin layer chromatography and acid hydrolysis

Classes or individual drugs	
Heroin	Glutethimide (Doriden)
Morphine	Methadone
Amphetamines	Methaqualone (Quaalude)
Barbiturates	Phenothiazines
Codeine	Quinine
Cocaine	

Enzyme Monitored Immunoassay (EMIT)

The EMIT technique is another sensitive and relatively easy technique for identifying drugs of abuse (table 2). It is more rapid than TLC, requires no urine extraction, and only a few milliliters of urine are required. The test can be performed directly in a clinical unit by

TABLE 2. Drugs detectable with enzyme monitored immunoassay (EMIT)

Classes or individual drugs	
Opiates	Benzodiazepines
Amphetamines	Propoxyphene[1]
Barbiturates	Cocaine
Methadone	Anticonvulsants

[1] Related chemically to methadone but is tested for separately.

an individual with minimal training. However, this method is more expensive than TLC and, with the exception of testing for propoxyphene and cocaine, results are class-specific, that is, they do not differentiate among drugs of a specific chemical class. For example, the test for opiates gives a positive for morphine or codeine.

It should be emphasized that urinalysis is by no means completely effective in diagnosing heroin use since intermittent injection in the absence of physical dependency can result in a negative urinalysis. False-negative results with TLC may occur if the urine specimen is too dilute, either secondary to the deliberate addition of fluid to the urine specimen (by the patient) or ingestion of large quantities of water or alcoholic beverages. False-positive reactions, though less frequent, may occur when spots of identical color and mobility caused by different drugs are observed on the chromatographic paper. The use of legally prescribed cough remedies containing narcotics may also result in a positive test on TLC, since a portion of codeine is transformed into morphine in the body. In addition, many drugs, including hallucinogens, alcohol, and marihuana, are not routinely detectable by laboratory analysis of urine.

If the patient has a bacterial urinary tract infection, a false-positive reaction with EMIT may occur with each test, giving the impression that polydrug use is present. When there is an actual or potential urinary tract infection, the presence of lysoenzyme should be determined to rule out the possibility of a false-positive reaction in the EMIT test.

Finally, the method by which the specimen is obtained and the quality of the analyzing laboratory are also important considerations. Specimens casually collected may not be from the intended individual, secondary to deceptiveness on the part of the patient, or due to laboratory mixups. The laboratory to which the specimens are sent should have high standards of quality control and be capable of providing reasonable clinical interpretations with regard to the limitations of method of analysis.

ANTEPARTUM MEDICAL MANAGEMENT

A complete and comprehensive medical and drug history, especially with respect to polydrug abuse, is of prime importance in the medical management of the narcotic-dependent woman.

In general, all pregnant patients who are substance abusers, regardless of the particular agent abused, are considered to be in a higher than normal risk category because of the complica-

TABLE 3. Medical complications encountered in pregnant addicts

Anemia	Tetanus
Bacteremia	Tuberculosis
Cardiac disease, especially endocarditis	Urinary tract infections:
Cellulitis	Cystitis
Poor dental hygiene	Urethritis
Diabetes mellitus	Pyelonephritis
Edema	
Hepatitis—acute and chronic	Venereal disease:
Hypertension	Condyloma acuminatum
Phlebitis	Gonorrhea
Pneumonia	Herpes
Septicemia	Syphilis

TABLE 4. Obstetrical complications associated with heroin addiction

Abortion	Intrauterine death
Abruptio placenta	Intrauterine growth retardation
Amnionitis	Placental insufficiency
Breech presentation	Post-partum hemorrhage
Previous cesarean section	Preeclampsia
Chorioamnionitis	Premature labor
Eclampsia	Premature rupture of membrane
Gestational diabetes	Septic thrombophlebitis

tions of illicit drug use. Chronic parenteral drug abuse during pregnancy has a variety of concomitant obstetrical and medical complications due to the method of drug administration, potential withdrawal from reduced availability of drugs, and lack of prenatal care for identification and treatment of problems. Infections account for a high percentage of medical complications (table 3) observed and they may have profound harmful effects on the pregnant addict and her unborn child—particularly if they remain untreated throughout gestation. Especially frequent are: types A, B, and non-A, non-B hepatitis, bacterial endocarditis (often with a variety of unusual organisms), tetanus, cellulitis, and venereal disease (2,3-7,10,16,19,20).

Active clinically apparent hepatitis occurs in some addicts. Many others have infection or liver damage documented by a variety of laboratory tests but are without clinical symptoms. Several studies have shown that over 60 percent of heroin addicts and former heroin addicts in methadone maintenance or drug-free treatment have persistent abnormalities of liver function tests due to chronic liver disease. This is most frequently a post-viral hepatitis disorder such as chronic persistent hepatitis.

chronic active hepatitis, or cirrhosis. However, occasionally these abnormalities may be attributable to alcoholic liver disease or a mixture of the types mentioned above (4,6,7,20,27). The use of contaminated needles during active heroin addiction is probably the most common cause of the high incidence of viral hepatitis. Over 12 percent of heroin addicts and former heroin addicts are chronic carriers of the hepatitis B antigen (20). Transmission of hepatitis B to neonates by HAA positive mothers may be a significant problem which has had limited study.

A high incidence of biologic false-positive serologies for syphilis occurs in both active and former heroin addicts (3,5,19). Therefore, specific tests such as treponema immobilization (TPI) or fluorescent treponemal antibody (FTA) should be used. Similarly, persistent

TABLE 5. Areas of special concern in the physical examination of pregnant, narcotic dependent women

System	
Dermatological:	Presence of infections, abscesses, thrombosed veins, herpes infections, pyodermas, icterus.
Dental:	Status of dental hygiene. Existence of pyorrhea or abscessed cavities.
Otolaryngeal:	Rhinitis, excoriation of nasal septum.
Respiratory:	Presence of asthma, rales, signs of interstitial pulmonary disease.
Cardiovascular:	Presence of increased pulmonary artery pressure or murmurs indicative of endocarditis or preexisting valvular disease.
Gastrointestinal:	Hepatomegaly, scars from injuries, incisional or umbilical hernias.
Genitourinary:	Presence of infections such as: condyloma acuminatum, trichomonas gavinitis, herpes vaginitis, gonorrheal urethritis, salpingitis, tubal abscesses. a) Uterus: Size, configuration, fetal position, fetal heart rate, fetal activity and placental localization and tenderness. b) Breast: Evidence of trauma, "lumps or bumps," nipples, used breast vein for injection.
Musculoskeletal:	Pitting edema, distortion of muscular landmarks due to subcutaneous abscesses or brawny edema.

TABLE 6. Initial routine laboratory tests

Complete blood count with indices	Serology (VDRL & FTA)
Urine: Urinalysis—routine and microscopic Urine colony count and culture and sensitivity Urine for drug screen	Cervical-rectal culture for *N. gonorrhea* Cervical culture Hepatitis associated antigen (HAA) Cervical Pap smear
Chest X-ray or T.B. skin test	Blood type; Rh and indirect Coombs
Electrocardiogram	Alpha-feto-protein if between 16 and 18 weeks gestation[1]
SMA-6	Ultrasound scan: 1. For confirmation of pregnancy after 6 weeks gestation 2. For biparietal diameter between 20 and 30 weeks gestation[1]
SMA-12	
Sickle prep[1]	
Rubella titer	

[1] Where appropriate—not necessarily routine procedures.

elevations of the immunoglobulins IgM and IgG are commonly observed in this group (10,19).

Obstetrical complications associated with heroin addiction (table 4) are those usually seen in any women lacking prenatal care. A frequent result of these complications is the birth of a low weight infant who has an array of problems due to prematurity and whose withdrawal symptoms are therefore difficult to manage. Further, in some cases, death of the pregnant woman and/or her fetus may occur from these untreated complications.

The obstetrical and medical complications in patients maintained on methadone are similar to those of heroin users, but without the persistent danger of infections from contaminated needles (19). However, methadone maintenance is not sufficient to reduce complications but must be offered in conjunction with prenatal care reinforced by psychosocial counseling. With this combination of services, complications will be identified and treated, thereby reducing maternal and infant morbidity and mortality (8,19).

Following the initial history, comprehensive physical (table 5), and laboratory diagnostic evaluations (table 6), a therapeutic plan must be formulated to manage the pregnant woman through the remainder of her pregnancy as well as during labor, delivery, and the post-partum period. The formulation of this plan is dependent

upon both the duration of the pregnancy and the character of the narcotic dependency present when the patient is first seen. The following discussion will elaborate suggestions for antepartal management, considering both pregnancy and drug dependence.

Long-Term Prenatal Treatment

In addition to the regular care that any pregnant woman receives, an addicted woman needs special close attention with emphasis on assessment of nutritional status as well as the detection of occult venereal disease. An initial hospitalization of 3-4 days is of benefit to both patient and medical staff in assessing the drug-dependent state and physical status and, after discharge, prenatal clinic visits should optimally be every 2 weeks until the patient has been stabilized. Urinalysis for drugs should be performed at every visit. Not only should weight, blood pressure, and a uterine fundus examination be performed, but time should be allowed to communicate with the patient. This will enable: a) the medical team to determine the patient's ability to conform to the regulations of the methadone clinic; b) the patient to elaborate her feelings and problems; and most importantly, c) determination of the patient's ability to learn a new lifestyle and acquire new living skills.

Detoxification

If the woman is dependent upon heroin, taking methadone, or taking other street drugs without medical supervision, a decision must be made as to whether detoxification from narcotics is a realistic option. Detoxification from opiates may be accomplished quite easily, starting at a dose of methadone no higher than 20 mg. and, if this dose is sufficient to maintain the patient in a comfortable state, slowly decreasing the dose by 5 mg. every other week over a period of a month. If a person is enrolled in a methadone program, seen early in her pregnancy, and wishes to be detoxified from methadone, this may be accomplished in a similar manner, utilizing the appropriate methadone dosage schedule. It is safest to detoxify between 14 and 28 weeks, in order to minimize abortion in the first trimester or the risk of precipitating premature labor and fetal distress in the last trimester (8,32). There is no question that it would be better if every pregnant woman could complete her pregnancy and deliver without the use of narcotics or any type of medication. However, in the majority of cases, this is simply not possible and is a naive, unrealistic goal.

Abstinence

Unfortunately, the course of abstinence in former heroin addicts during pregnancy is not smooth. Pregnant women recently detoxified from narcotics have the same high rate of recidivism as nonpregnant addicts and thus become resubjected to all of the attendant complications of illicit heroin use. The return to illicit heroin injection exposes the fetus to the risk of varying narcotic levels, which may well result in transient periods of fetal depression alternating with withdrawal (12,16,22,29,31,32). Uterine contractions during maternal withdrawal cause an intermittent obstruction to placental perfusion resulting in intermittent fetal hypoxia.

The multiple medical and pharmacological complications during parenteral heroin abuse must be considered before rejecting methadone maintenance treatment or recommending detoxification from methadone during pregnancy. Also, polydrug or alcohol abuse may become an increasing problem if maintenance treatment is denied, if a dose reduction of methadone is carried out too rapidly, or if selected maintenance doses of methadone are too low to prevent supplementation with heroin. Many patients in these circumstances will use either illicitly obtained methadone or heroin. Others may turn to chronic abuse of tranquilizers, sedatives, barbiturates, or alcohol. Unfortunately, many well-meaning but poorly informed physicians may prescribe drugs such as diazepam for pregnant patients to blunt abstinence symptoms during methadone withdrawal. The use of such drugs may not only substitute another type of dependency, but, in addition, may be quite hazardous to the fetus (see chapter II, pp. 21-23).

Unless intensive counseling and an inpatient setting are available, it is recommended that women in an outpatient situation be given the option of maintenance on low dose methadone[1] for the duration of the pregnancy. With this therapy, injection of heroin is usually infrequent. It must be emphasized that informed consent for the use of methadone must be obtained, with all of the possible effects of methadone on both mother and baby being explained fully by the treating physician prior to initiating methadone therapy. Risks attendant to refusing treatment must also be fully explained.

[1] Low dose methadone: a daily dose of methadone of *less than* 30 mg.

Methadone Maintenance

For women who have been maintained on high dose methadone maintenance (up to 100 mg.) prior to becoming pregnant, it is usually possible to slowly decrease the daily dose at a rate of 5 mg. every 2 weeks to a daily dose of 40 mg. It should be emphasized that there has been no evidence presented to indicate that the course of pregnancy or fetal outcome is predictably different in women maintained on doses up to 100 mg. per day. This may be related to the observation that a tenfold variation in plasma methadone levels has been observed in persons maintained on the same daily oral methadone dose (21). (More information concerning this may be found in chapter II on pharmacology.) The dose should be individualized at a level sufficient to minimize the use of supplemental illicit drugs, since they represent a greater risk to the fetus than the higher doses of methadone required by some patients.

Whatever the methadone dose, it is essential to follow carefully the mother's progress during pregnancy. Since it is possible that the severity of withdrawal may be less in an infant whose mother is maintained on 40 mg. of methadone as compared to 100 mg. (29), it is not unreasonable to lower methadone levels slowly in these women, especially if the pregnancy is between 14 and 28 weeks.

Short-Term Therapy

If the pregnant woman taking street heroin is seen during the last trimester, extremely cautious assessments must be made. It must be emphasized that manipulation of the dose in women maintained on methadone should be avoided in the last trimester because of its association with increased fetal complications (8,32). If the woman is using street heroin when seen, a 20 mg. dose of methadone should be administered on a daily basis, with 5 mg. increments every 3 days, as necessary, to keep the individual comfortable and prevent withdrawal. As with women seen in the first trimester, the results of the weekly urinalysis should be reviewed to determine the effectiveness of methadone in preventing illicit heroin and other drug use.

Narcotic Overdose

Narcotic overdose may occur from a variety of factors: the pregnant heroin addict may inject more heroin than intended; the pregnant methadone-maintained patient may accidentally ingest an

overdose of methadone; pregnant sporadic drug abusers may self-administer a dose of narcotic beyond their degree of tolerance; a small child may accidentally ingest a treatment dose of methadone of a parent, a relative, or family friend. In each of these cases, a narcotic overdose syndrome may ensue. When an overdose is due to an intravenous injection of heroin or a similar rapid-acting narcotic, symptoms may occur within seconds. When excess methadone is accidentally or purposefully taken orally, symptoms may not appear for 1-3 hours and may progress over a 3-6 hour period with effects lasting for over 24 hours. Narcotic overdose may result in respiratory depression, apnea, obtundation, coma, and pulmonary edema.

After establishing an airway and supporting respiration, an intravenous line is placed and naloxone (Narcan), the pharmacological treatment of choice for any narcotic overdose, is used. Naloxone is a pure narcotic antagonist with no agonist activity and no central nervous system depressant effects. It is safe to use in the treatment of narcotic overdose even if the diagnosis is not definitely established. Naloxone should be administered intravenously at a dose of 0.01 mg/kg body weight; this dose can be readministered at short intervals (e.g., every 5 minutes) until the patient regains consciousness. Naloxone has a maximum duration of action of only 2-3 hours, whereas most short-acting narcotics have a 6-8 hour duration of action, and methadone a 12-48 hour duration of action. Thus, once a patient has regained consciousness and the respiratory rate has returned toward normal, continued close observation is essential. Due to the duration of drug action, symptoms of overdose may be expected to recur within 3 hours and should be retreated as needed with naloxone, given intravenously or intramuscularly.

Special care must be taken when it is necessary to give naloxone to methadone maintenance patients or physiologically dependent heroin addicts, as severe acute narcotic withdrawal symptoms will be precipitated. In the pregnant addict these may be very hazardous for the fetus. Doses of naloxone should be titrated against clinical symptoms in this setting and a short-acting narcotic should be available for use to reverse acute symptoms of withdrawal.

Gastric lavage may be helpful when an oral drug has been ingested within 1-3 hours prior to institution of treatment. If lavage is necessary for treating a comatose patient, tracheal intubation should be carried out first. Hemodialysis or peritoneal dialysis are not helpful, since only very small proportions of narcotic are free in plasma or serum. Most narcotics in the bloodstream are extensively bound to plasma proteins.

Central nervous system stimulants are ineffective against the depressive action of narcotics and should not be used.

PSYCHOLOGICAL CARE DURING GESTATION

One of the most difficult challenges facing the primary care physician is the provision of prenatal care for the pregnant addict. Usually the patient does not like doctors and avoids the health care delivery system. These negative feelings are all too frequently reciprocated by the physician. How, then, can these polarized forces be brought together?

Most successful programs of care for pregnant addicts have adapted both prenatal and postnatal clinics to meet two needs (1,2,12,31). First, the characteristics of the pregnant addict must be taken into account, necessitating adaptation of the physician to the behaviors described below, rather than trying to force the patient to behave in a conforming manner. Secondly, the physicians (internist, obstetrician, and pediatrician) and other health care professionals require support in dealing with patients whose behavior may range from mystifying to infuriating.

In essence, the provision of adequate prenatal and postnatal care, including pediatric services, requires a setting which is nonjudgmental and nonpunitive. The mother, her children, her spouse, and other family members should feel welcome and comfortable in the clinic. Although appointments are made for many purposes, the clinic should be open at regular times every week. Service should not be denied because appointment schedules are not kept. In addition, the physician must realize that treatment for the mother's addiction is essential in order to obtain a positive response to medical treatment of both mother and infant. This will usually mean a specialized program with both professional and paraprofessional staff who are skilled in working with addicts. The staff of the addiction treatment program, by managing the disturbing aspects of the pregnant addict's behavior, can provide valuable support to the physician providing prenatal and postnatal care to both mother and infant.

Characteristics of the Pregnant Addict

Beneath a facade which appears to be uncaring and indifferent, the pregnant addict has strong conflicting emotions (9,14). She usually experiences anxiety that is based on expectations, assump-

tions, and past experience. There is an expectation of criticism and rejection from the clinical staff. The woman expects that the physician will punitively order her to discontinue taking all drugs, under the guise of concern for the developing baby's welfare. A common underlying assumption is that the clinical staff will be either incapable of or uninterested in understanding her situation or problems. Her worst fears will be confirmed if the physician decides on the medications and doses to be used in treatment without consulting her. All too often past experience of her own, or that of a friend, has provided an apparently factual basis for these expectations and assumptions.

Guilt and shame, coupled with low self-esteem, are also common emotions. There may be good reasons for these feelings based on the addicted woman's perceptions of the effects of her behavior on herself, her children, her family, and the community in which she lives. These unpleasant feelings are usually denied and must be inferred from the woman's behavior. Staff comments that are designed to make the pregnant addict feel guilty or ashamed are not well tolerated. The usual result is a loss of willing contact with the staff and destruction of a positive therapeutic relationship, which is the cornerstone of adequate obstetric and pediatric care.

Awareness of the above, and other emotions, make the behavior of the pregnant addict easier to comprehend. The following behavior problems are frequently encountered (13):

1. *Lateness or missed appointments*: The patient may appear at the end of a scheduled appointment or at some other time.
2. *Continued use of illicit drugs*: Frequent urine monitoring and close clinical observation will help bring this problem into the open.
3. *Intoxication*: Usually this will be from CNS depressants such as alcohol, barbiturates, benzodiazepines, or other psychoactive agents, some of which may have been obtained from other physicians. A breathalyzer in the clinic can provide useful information and avoid angry confrontations. Stimulant intoxication from amphetamines, cocaine, or methylphenidate is less common and less easy to detect clinically.
4. *Illicit activity*: A variety of illegal behaviors used to support drug addiction may continue. This may result in arrests and legal problems. However, prenatal care is rarely terminated, since most judges are reluctant to incarcerate pregnant women. Negative emotional reactions of physicians, nurses, and other staff may then present a problem.

5. *Irritability*: Anger, often stemming from past or present hurts, may spill over onto people in contact with the pregnant addict. Children may be abused or neglected. Her spouse and/or other supporting family members may withdraw or leave. The result may be social isolation from all but other active drug users. Health care professionals often have great difficulty with this kind of behavior and may be tempted to respond in kind.
6. *Impulsive, demanding, provocative behavior*: Clinic rules may be broken in ways that alienate health care professionals and invite termination from treatment.

No one welcomes or easily tolerates these behaviors. The burden, however, can become manageable by sharing it with others. A structured program which includes paraprofessionals with "street" experience is usually most effective in controlling these behaviors in the clinic setting. Paraprofessionals are much less likely to be offended by or to respond punitively to these behaviors. They are, therefore, of value in absorbing stress that disturbs other health care professionals. In this way, they help preserve an effective therapeutic relationship.

The clinical staff should remember that the intolerable behavior of the pregnant addict reflects low self-esteem and devaluation of herself as a person (9,14). Abrupt termination from treatment is not a satisfactory solution. Through experience, it has been found that the woman terminated from care is at increased risk of suicide from drug overdose or some similar self-destructive act and, further that the woman who discontinues prenatal care also places her fetus in jeopardy.

The Role of the Physician

The physician's role includes more than the provision of medical care. The pregnant addict is often in crisis and at a turning point in her life. Skilled handling may not only have an impact on her, but on other members of the family as well.

The first prenatal visit is of particular importance. The pregnant addict is much less likely to return for a second visit than is her nonaddict counterpart. In addition, the likelihood of return depends much more on her subjective reaction to the first visit. A suggested format for the physician's activities during that visit is as follows:

1. *Be supportive*: Emotional support for the woman does not mean support for her drug use or the aforementioned behaviors.

The physician and other staff can strongly support the woman's participation in prenatal care and the implied intention of taking good care of herself and her developing baby.

2. *Explore treatment for addiction*: If the woman is in treatment, the physician needs to know where and with whom. If she is not, the importance of that treatment as an essential complement to prenatal care needs to be stressed. This issue is raised early in the session so that the physician can call in a counselor from a known program to begin working with the woman on treatment for her addiction. (See the following section, *Characteristics of an Addiction Treatment Program.*) Personal contact is a far more effective method of referral for treatment than giving the woman an address or phone number. A review of the effects of drugs on the developing fetus may be beneficial at this time (see chapter II), especially if chemotherapy, such as methadone support, is to be used during the pregnancy. The addict may have an extensive knowledge of street pharmacology, but often has serious misconceptions about how damaging heroin and illicit methadone (because of unknown dose) are to the baby. On the other hand, she may minimize, or be unaware of, the more toxic effects of central nervous system depressants, such as alcohol and barbiturates. The physician can stress the fact that while abstinence is ideal, it may prove to be realistically impossible. In that case, the lesser of two evils is a known drug used under medical supervision and control. Street drugs or self-prescribed drugs of unknown quality and quantity, often laced with potentially infective or toxic impurities, are much more dangerous.
3. *Get baseline data*: A good history and physical examination (table 5) as described earlier provide essential data for management of the pregnancy and delivery. These activities also aid in establishing a positive relationship between physician and patient, which may be very useful when problems arise later on. Warm hands and instruments facilitate the development of this relationship. To ensure accurate data the physician should refrain in a self-disciplined way from any negative judgmental emotional comments or reactions. Furthermore, this is not a good time to try to educate the patient. It can be viewed as a time when the patient educates the physician about her use of drugs, her lifestyle, and her state of mind and body.
4. *Initiate treatment:* The physician should resist impulses to detoxify every patient. If the woman herself wishes to attempt detoxification and there are no medical contraindications such

as imminent delivery or potential fetal distress (first and third trimesters), then it can be cautiously attempted. It is wise to avoid multiple medications. If analgesics, hypnotics, and tranquilizers or antidepressants are needed to control withdrawal symptoms, then it is preferable to use a single substitute for the drug of abuse, e.g., methadone for heroin. Treatment of infections and nutritional, metabolic, or other problems should be started. Assignment of medical and nursing staff who can follow the woman through her pregnancy should be made in view of the importance of stable, positive relationships in the treatment of the pregnant addict.

5. *Begin patient education*: A good beginning is with the medical findings, which are familiar ground for the physician and readily accepted by the patient. Chemotherapy and the patient's drug use, including alcohol and nicotine, can be reviewed, including expression of the physician's concerns. It is at this point that the physician's own values may be expressed and a decision made about whether a working relationship can be established for the remainder of the pregnancy. The need for long-term treatment of the addiction is an important concept to be emphasized. This will lead into the importance of long-term followup to assess the overall impact of the mother's drug use on her baby and to assure the child's best chance for long-term health, without later drug abuse problems (see chapter II). The possibilities of a normal outcome for the pregnancy ought to be stressed by the physician. The expectant mother may be anticipating an abnormal outcome; she needs whatever hope can be offered, without making false promises. Emphasis on the positive role the woman can play in her own prenatal care and later as an effective mother may also help increase her self-esteem (14).
6. *Explore sensitive areas*: Issues such as abortion, family planning, and adoption should be brought up at the end of the visit. Several purposes are served by raising these issues in a nonthreatening, nonjudgmental way. The woman may be relieved to find that she can consider options in what had been personally or culturally taboo areas. Possibilities may be raised of which she had been ignorant or had never considered possible for herself. Through this process, the patient learns that emotionally loaded issues can be discussed confidentially and dispassionately with her physician. Perhaps most importantly, respect is communicated for the woman as a person who can make responsible decisions and who will benefit by any information the physician can provide.

Involvement of the family, including spouse, parents, children, or other close relatives living with the woman, should be considered by the physician (25). Although not essential to adequate prenatal care, family involvement is extremely important in treatment of the addiction and in positively influencing the environment in which the new baby will be raised.

The physician's language can be an important factor in determining the woman's response to treatment. Pejorative words relating to drug use should be avoided. Patients react negatively to terms such as "junkie," "wino," "lush," "druggy," or even "addict." The term "addict," "addicted," or "the littlest junkie" should never be applied to the infant, for it is not only inaccurate, but it also arouses strong guilt feelings and resentment in the mother. The physician's language, therefore, impacts on the mother-child bond as well as on the physician-patient relationship.

CHARACTERISTICS OF AN ADDICTION TREATMENT PROGRAM

Addiction treatment programs vary widely in the quality of care delivered to patients. Even the good programs are not always receptive to or supportive of the pregnant addict or new mother (14). The skill shown by many ex-addict paraprofessionals in dealing with addicted individuals in treatment does not always carry over to work with the pregnant addict.

Typically, pregnant women are initially welcomed and treated well. When behavioral problems develop, staff attitudes usually change in a negative direction. The men especially may become very critical and contemptuously rejecting of the woman. Apparently, pregnancy touches an area of unresolved conflict about child-rearing in many former addicts. At first the pregnant woman is seen as a potentially ideal parent, who, in raising her child will undo all the bad things that had been done by most addicts' parents. When reality reveals the pregnant woman's less than ideal qualities, she is then seen as a bad mother, unfit to raise a child and undeserving of respect as a person. Similar negative attitudes are often found in non-addicted persons such as physicians, nurses, and other professionals who deal with the pregnant addict.

In looking for a program which will provide long-term treatment for the pregnant addict, physicians and other referring professionals will find the following desirable characteristics useful guides to the quality of treatment available:

1. *Trained staff* with an approach to treatment which emphasizes maintaining a long-term relationship with the woman and which is oriented toward helping her change her lifestyle.

2. Adequate *physical, interpersonal, and social support* for the woman. It is ideal if transportation is available for prenatal clinics and on call when the woman is ready to deliver.

3. A *family orientation*. It is very important that family members are welcomed in the program and included in appropriate educational, recreational, and therapeutic activities. Day care for children or at least an area for infant and child use is essential in facilitating the woman's participation in treatment.

4. A realistic approach to *chemotherapeutic support*. Physicians prescribing medication in the treatment program need to be able to communicate and cooperate with physicians providing primary obstetric, pediatric, and medical care. Attempts to withdraw the pregnant addict from chemical support should include adequate fetal monitoring to detect any fetal distress that may result. Attempts at detoxification may need to be discontinued if the woman's use of prescribed or self-prescribed drugs, including alcohol and nicotine, is increased and therefore poses a threat to either her own or the developing infant's health.

5. An *educational and vocational orientation*, which is very important in providing opportunities for an alternate lifestyle and in the development of new skills. Parenting skills and developmental knowledge are particularly useful for the pregnant addict and her mate as they raise their own children, if they are going to move beyond the type of parenting they received.

SUMMARY

The prenatal period offers a unique opportunity for physicians to have an impact on both the treatment and prevention of addiction. The pregnant addict is open to change and influence. More than at other times in her life, medical treatment during the prenatal period should complement and facilitate the long-term treatment of the woman's addiction. The time and effort expended by physicians and other caregivers in providing prenatal care can be an investment which pays off richly for the individual patient as well as for the community in later years.

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CHAPTER IV

Management of Labor, Delivery, and the Immediate Post-Partum Period

MANAGEMENT DURING LABOR AND DELIVERY

Medical Management

The medical management of pregnant drug-dependent women during labor and delivery should follow accepted standards for nondrug-dependent women (3,13,15,16). In addition to complications commonly seen in the intrapartal period, several others may occur owing to poor general health, lack of prenatal care, and symptoms of narcotic withdrawal.

The most frequent complication is bleeding resulting from a very friable cervix, venereal condylomata, abruptio placentae, uterine atony, or toxemia. Also, more breech presentations occur, primarily because of a higher incidence of prematurity.

Infection is quite often a complication in the drug dependent woman who has sought no prenatal care and presents in labor. She may even have prolonged rupture of membranes for up to several days prior to her admission in labor. It is therefore imperative to obtain cervical cultures as well as cultures from other areas where infection is suspected.

Further complications arise if maternal narcotic withdrawal occurs. Intrauterine irritability secondary to the withdrawal may produce the onset of premature labor. When premature labor is diagnosed with intact membranes and a live fetus, in the absence of medical and/or obstetrical complications, pharmacological inhibition of contractions with ethanol may be considered (6). As an aid in the management of this situation, the lecithin/sphingomyelin ratio should be determined to differentiate a premature from an intrauterine growth-retarded fetus. The fetus, at first assessment by dates and physical examination, may appear to be premature. The results of the lecithin/sphingomyelin ratio, though, may show a fetus with respiratory maturity that is intrauterine growth retarded, and thus pharmacologic inhibition of labor would not be indicated.

Depending upon the time and amount of the last dose of narcotic taken by the drug-dependent woman presenting in labor, withdrawal may occur as labor progresses. Upon admission, the medical staff, in this or the above case, should ask when the last methadone and/or heroin was taken and observe for signs of withdrawal.

If narcotic withdrawal is identified, a narcotic should be administered promptly to halt the progression of symptoms. With maternal withdrawal, there is fetal withdrawal. Thus, due to increased muscle activity during withdrawal, there begins a cycle of reduced availability of maternal oxygen to the fetus and an increased need for oxygen by the fetus. Allowed to progress, fetal distress will result with the attendant risk of meconium aspiration. Electronic monitoring is an obvious advantage in the management of labor so that fetal distress, from any complication, may be readily identified.

Analgesia

The choice of the analgesic agent and the dosage for the addicted woman during labor should be determined, as in any nonaddicted woman, by the patient's progress and the well-being of the fetus. It is important to note that all analgesic drugs enter the fetal circulation. If the fetus is already physically dependent on narcotics or CNS depressants, it will be less sensitive than nontolerant fetuses to the respiratory depressing effects of analgesic or sedating medication given to the mother in labor.

At the present time, the analgesic agent of choice is 50 mg. meperidine (Demerol) with atropine 0.4 mg., or alphaprodine (Nisentil). This is usually administered to a primagravid patient at 5 cm. of dilatation and station zero; earlier to a multiparous patient. Additional medication may be given to meet the patient's requirements, but if the estimated time of delivery is within 2 hours, further analgesic medication should not be given.

Ideally, the patient who has attended prenatal classes, including exercises and instructions for breathing and relaxation, will require little or no analgesia for a normal labor under controlled circumstances. The one psychological danger is in creating an unrealistic standard which the patient is unable to meet, with consequent guilt and loss of self-worth if medication becomes necessary.

If narcotic withdrawal occurs or is probable because of a long interval between doses, the patient's daily dose of methadone should be given or, in the case of a heroin addict, a dose of a short-acting narcotic should be administered. The administration of these

medications is for the control of withdrawal and is *in addition* to the usual analgesia during labor.

Anesthesia

The type of anesthesia is usually determined by circumstances during labor and delivery. Anesthetized patients in uncomplicated term deliveries will usually give birth to vigorous infants, providing earlier doses of analgesics are not of sufficient magnitude to cause respiratory depression, and the duration and amount of anesthetic agent are appropriate. The use of parenteral anesthetics such as thiopental in low doses (less than 7 mg/kg) intravenously, although usually tolerated by the infant, has been associated with transient arterial hypotension in the mother. Higher doses are known to result in a higher incidence of drug-induced fetal depression. For this reason, parenteral systemic agents should be avoided if at all possible.

Inhalation agents rapidly cross the placental barrier, but in analgesic doses do not produce clinically significant neonatal depression. Excessive use may cause problems.

Regional anesthesia with an epidural, low spinal, or paracervical block is often used. All of the amides used for these purposes rapidly cross the placental barrier within 1-3 minutes after injection. Repeated injections may result in maternal and fetal drug accumulation, which is especially serious if malnutrition and a decrease in serum proteins exist. It should be emphasized that, because of greater vascularity, the paracervical area absorbs local anesthetics more rapidly than the epidural space does, thus increasing the likelihood of fetal depression. The potential for toxicity can be diminished through the use of rapidly metabolized esters or long-acting anesthetic agents.

Choice of anesthetic should be based on an individual evaluation of the patient. For the uncomplicated term delivery, low spinal or epidural anesthesia may be of value. With the multiparous woman experiencing a rapid second stage, a pudendal block or only local anesthesia for the episiotomy may suffice. Finally, in the high-risk patient it may be advisable to combine inhalation and regional anesthesia using very small amounts of each (11).

Psychological Management

Labor and delivery represent a period of high stress for the pregnant addict. Pain is a physiologic antidote to narcotics and also

diminishes the effect of other drugs upon which the woman may be dependent. As a result, she may be admitted in a state of intoxication, having anxiously taken additional drugs to compensate for the real or anticipated stress. If not, she may be in a state of withdrawal even though taking the same amount of drugs which suppressed withdrawal symptoms before labor began.

The physician may find it useful to expect that the woman will have taken extra drugs. Then, if she has, he will not be surprised or react in an angry or punitive way. If she has not taken anything, the physician can then be genuinely pleased, supportive of the woman's courage, and less reluctant to use adequate doses of analgesic medication to ensure the highest possible level of cooperation from her during labor and delivery.

Active participation by the woman during labor and delivery may be beneficial for her and gratifying for the physician. This represents a change from her usual pattern of avoidance or passive withdrawal from stressful situations.

Participation by the spouse or mate and other primary family members offers additional benefits (14). Encouragement by the physician will be necessary, because the sexism of street lifestyles tends to preclude male involvement in many aspects of child-rearing and other "women's" activities, including childbearing (4).

Immediate parental contact with the newborn infant in the delivery room is desirable, if the mother intends to keep the baby (8). There is some evidence that allowing the infant and parents to remain together for 45-60 minutes immediately following delivery enhances the quality of parent-child bonding and increases the likelihood that the child will thrive (8). At this time either the physician or a nurse can assist the new parents to develop skill in tender, careful handling of their infant. This handling is characterized by full palmar rather than fingertip contact. It is skin to skin, warm, unhurried, and provides close physical contact. Support is provided, especially for the infant's head, encouraging an "en face" position between baby and parent. Responsive adjustments are made to the infant's movement without removing protective support. In addition to facilitating parent-child bonding, tender careful handling provides the parents with a real-life example of responding to feedback and stimulation from the child, thus setting the stage for two-way communication between parent and child during the next few years.

If a decision has been made to give up the child for adoption, it should be removed from the delivery room as soon as possible. This is an extremely stressful time for the mother, regardless of her calm

appearance. The physician and other staff can help during this period of crisis by supporting her decision and facilitating contact with positive family members and staff from the woman's treatment program.

IMMEDIATE POST-PARTUM MANAGEMENT

Medical Management

The post-partum course is monitored as in any other pregnancy. The necessity for continued methadone maintenance is obvious. The length of stay in the hospital depends upon whether there are obstetrical problems. If there has been a normal labor and delivery, the patient is usually discharged on the fourth or fifth post-partum day. The infant, however, as discussed in later sections of this chapter, may stay longer, especially if withdrawal symptoms occur (see also Chapter V).

Breast Feeding

A number of drug-dependent women express a desire to breast feed their infants. Since it is known that narcotics, sedatives, alcohol, nicotine, and many other drugs, as well as environmental agents, are secreted in breast milk, it has been usual practice to advise against breast feeding. Until recently, however, there has been little objective information on which to base this advice.

Successful breast feeding contributes significantly to maternal-infant bonding. For this reason, as well as for immunologic benefits, breast-feeding should be encouraged if not contraindicated by associated risks. The milk of a mother whose intake of drugs is erratic or who engages in alcohol or polydrug abuse represents a hazard to the infant, and artificial feeding should be advised.

Questions remain as to the advisability of breast feeding by women on methadone maintenance. In two recent studies, levels of unchanged methadone were determined in the early post-partum period in the breast milk of 11 patients maintained on 10 to 80 mg of methadone daily (1,2,10). In one study, the mean level of methadone in breast milk was 0.27 ± 0.06 μg/ml in patients receiving a mean dose of 50 mg per day. The ratio of levels in milk to those in simultaneously obtained maternal plasma was 0.83. Relationship of sampling time to time of methadone dose was unspecified. In the second study, specimens of colostrum-milk and

blood were obtained sequentially following an oral 50 mg dose of methadone on 7 consecutive days post-partum. The ratio of colostrum-milk to plasma ranged from 0.07 to 0.38, with peak concentrations in colostrum-milk observed at 1 to 2 hours after peak concentrations in plasma. The peak level of methadone in milk was 0.12 μg/ml. It has been reported that the daily intake of the average newborn is 400 ml of breast milk during the first week of life, approximately 475 ml during weeks 2-5, 765 ml during weeks 5-13, and 935 ml during the fourth through sixth months (9). If the peak concentrations observed in the second study (0.12 μg/ml) were used to calculate estimated ingestion of methadone, a neonate might ingest 57 μg/d during the first 5 weeks of life and up to 112 μg/d in the first 6 months of life. If the peak concentrations observed in the first study (0.57 μg/ml in a patient maintained on 80 mg/d) were used in calculation, up to 271 μg/d might be ingested during the first 5 weeks of life and up to 533 μg (or one-half mg) per day in the first 6 months.

These data seem to indicate that the infant of a methadone-maintained mother would be exposed to very small amounts of methadone in breast milk as compared to those transmitted *in utero* (1). More studies are needed in larger groups of patients. Information is lacking on the following: (a) the full range of variability of breast milk levels in different women on given doses of methadone; (b) methadone concentrations in breast milk beyond the neonatal period (although experience with other substances suggests that levels might be lower in later milk than in the more fatty colostrum); (c) physiologic and developmental effects of prolonged intake of even small amounts of narcotic in the early months of life; (d) the volume of breast milk consumed (and therefore the dose) beyond 6 months of age; and (e) fluctuation of breast milk levels in relation to time of mother's dose (if known, nursing could be scheduled so as to avoid peak concentrations).

In weighing present information and uncertainties (1,2,9,10), the risk/benefit ratio of permitting or denying breast feeding must be considered. The risks of a poor attachment between mother and infant are great, with attendant dangers of neglect and child abuse for the infant and a worsened self-image for the mother. Since breast feeding is an important contributor to early attachment, it seems advisable to permit it for the mother who is: (a) well controlled on a stable dose of methadone, (b) in a well-supervised drug treatment program, and (c) motivated to nurse her infant. Since studies suggest that bonding is an early phenomenon and that immunologic benefits are largely achieved in the first 2 months of

life, there seems no need to encourage prolonged breast feeding. In fact, periods longer than 3-6 months are probably inadvisable in that the increasing quantity of milk ingested by the larger infant would possibly increase the amount of methadone ingested. Also, the possibility of intake of other drugs by the mother is increased as the time is extended.

Any mother on methadone who chooses to nurse should be carefully followed along with her infant to insure that she is not using other drugs and that her infant suffers no ill effects (12). Careful history taking, physical examination, counseling discussions, and routine urine monitoring should be carried out regularly in all addicts and former addicts in treatment during pregnancy and the post-partum period. There should be close cooperation between the personnel treating the mother and those following the baby.

Family Planning

Beginning in the prenatal period, education for birth control and family planning should be provided and emphasized. The idea of spacing pregnancies should be introduced with reinforcement that there can be control over becoming pregnant and that there are many factors to consider when making the decision to have another child, i.e., the number of children born, the number wanted, the ability to care for the children present and future, the drug-dependent status. The women should be encouraged to feel satisfaction about controlling this aspect of her capabilities.

Several routine methods of birth control are not optimal in the drug-dependent population, and evaluation on an individual basis is essential. Oral estrogens, preferably low dose, should be prescribed with care, as many of these women have vascular disease secondary to prolonged drug abuse and, in addition, they may not be conscientious in taking prescribed medications. Intrauterine devices (IUD) may be considered if the patient's past history does not include pelvic infections, but an additional complication with IUD is the possibility of exposure to venereal disease. The barrier-type methods, which are the safest medically, are not the most effective and require consistent use.

The injectable long-acting progesterones (medroxyprogesterone acetate) have not as yet been approved by the FDA as contraceptives, but may be of potential value in the drug-dependent population. The safety of these agents and their use in women with specific medical disorders remains to be determined.

Of course, permanent sterilization can be introduced as a possibility, especially if the patient is extremely high risk. The procedure can comfortably be completed before discharge post-partum.

The need for appropriate family planning must be stressed, because an unwanted pregnancy may only add unnecessary anxiety to an already precarious situation. Counseling should be readily available and should involve both parents whenever possible.

Psychological Factors

Frequent, sustained contact between mother and infant should be encouraged. If maternal interest is not established and maintained, there is a diminished chance that the infant will receive adequate parenting later (8) (see chapter I).

Close contact with her infant makes it possible for the mother to engage in comfort-promoting activities under supervision when the infant is hospitalized and may be undergoing withdrawal. The woman is therefore treated as though she has the capability to become a skilled mother. If she demonstrates otherwise, however, alternate sources for care can be provided while she and the infant are still in the hospital.

Parent Participation in Managing Infant Withdrawal

The presence of withdrawal symptomatology, except in severe degrees (i.e., seizure activity and projectile vomiting, etc.), is not sufficient reason for separating mother and child. The mother can be taught to observe her infant and intervene in ways designed to facilitate infant comfort and provide for alleviation of symptoms. Table 1 presents infant abstinence behavior followed by appropriate parent intervention, adapted from the outline of "Nursing Care of the Drug-Dependent Infant" utilized at Thomas Jefferson Hospital in Philadelphia (5).

The nursing staff should: (a) encourage the mother in developing caregiving activity, and (b) demonstrate effective techniques of physical and psychosocial intervention. It is very reassuring for the mother to learn that the infant will not suffer permanent damage from withdrawal, as the infant's experience is similar to the mother's experiences in withdrawing from drugs.

In addition to facilitating caregiver activities and stimulating maternal-infant attachment, there is another noticeable psychological benefit from the parent's active participation in caring for the infant from the time of birth. Guilt is relieved through the

TABLE 1. Maternal caregiving in a hospital nursery setting and at home[1]

Infant behavior	Maternal intervention
Protracted and/or high-pitched cry	Soothe infant by holding snugly and close to your body. Swaddle your baby with a blanket if he/she is too active for you to hold snugly.
Inability to sleep	Reduce environmental stimuli, such as loud noises, bright lights, and excessive manipulation. (Don't handle or jiggle your baby too much. Humming and rocking may be soothing.)
	Decrease feeding intervals or introduce demand feeding schedule.
Frantic sucking of fists	Ask nurse for infant shirts with sewn-in sleeves for mits to prevent damage to the skin.
	If skin is damaged (e.g., scratched by infant's own nails), keep affected skin area clean with a mild soap and water.
	Ask nurse for a pacifier.
Sneezing, nasal stuffiness, and trouble breathing	Clean nose frequently if plugged with mucus or dried formula.
	Don't restrict chest movements with tightly wrapped blankets (i.e., swaddling).
	If your baby's skin color appears very pale, grey, or blue, call the nurse or doctor immediately.
	If your baby appears to be breathing too rapidly, count his/her respirations for one full minute, and if he/she is breathing 60 times or more, tell the nurse or doctor.
	Feed smaller amounts of formula at more frequent intervals. Allow more time for feeding with rest periods between sucking.
	Maintain infant in a sitting position.

TABLE 1. Maternal caregiving in a hospital nursery setting and at home[1] (continued)

Infant behavior	Maternal intervention
Poor feeding	Feed small amounts of formula at frequent intervals.
Regurgitation	Take extra time to burp your infant gently and well.
Vomiting	Feed baby slowly if he/she begins to "gulp" or vigorously suck on nipple.
	If baby is sucking poorly, support chin and both cheeks to increase sucking ability (ask your nurse to demonstrate this feeding technique).
	If baby has been vomiting or regurgitating, keep him/her on his/her side or stomach to prevent breathing in vomited formula.
	Clean skin area with mild soap and water immediately after infant has vomited or regurgitated because stomach contents contain acid which can irritate and damage skin.
Stiffness or rigidity Hyperactivity	Bathe baby frequently in warm water with mild soap, dry well, and apply any medicines, ointment or cream the doctor has prescribed or recommended.
Trembling	Change position frequently (every half-hour to every hour). Position baby on soft flannel blankets or a sheepskin.
	Expose raw (or "rubbed") areas of the baby's skin to the air or use a heat lamp every 2-3 hours (ask nurse to show you the correct technique).
	Decrease environmental stimuli (noise and too much handling).
Fever (temperature of 100 degrees or greater)	Do not swaddle. Remove extra covers.
	Reduce clothing to shirt and diaper only.
	Decrease environmental temperature.
	Sponge baby in lukewarm tap water.

[1]Adapted from outline of "Nursing Care of the Drug-Dependent Infant," Thomas Jefferson Hospital, Philadelphia (5).

process of restitution. The mother's efforts and lost sleep can be experienced as a form of penance, possibly resulting in an increase in self-esteem with less depression and less self-destructive behavior. If a team offering intensive psychosocial counseling services can provide psychotherapy or strong support while the mother is still in the hospital, gains in the mother's emotional status can be made and consolidated (5).

Discharge From the Hospital

Whenever possible, it is preferable to discharge the mother and her infant together. Separation of the two can produce weakening of the mother-child bond or prevent it from developing. There is evidence that bonding failures are associated with child abuse, abandonment or neglect, and failure to thrive (8). Keeping the mother in the hospital a few extra days can be advantageous in giving her more time to develop parenting skills under supervision. Both mother and father will respond better to demonstrations than to being told what to do. The most effective nursing and paraprofessional staff, in these situations, are those who enjoy teaching experientially. If the parents have difficulty learning, then the addiction treatment program should be notified. Psychiatric consultation may also be useful when impaired learning is present, providing the psychiatrist is not negatively biased against drug-dependent persons.

The importance of a strong parent-child bond for positive future development of the infant emphasizes the necessity of a close working relationship between obstetrical, nursery, and pediatric staffs (8). Maternity and nursery policies require coordination designed to maximize the positive parent-infant contact and minimize separation. Since every infant exposed to dependence-producing drugs *in utero* requires 5-7 days of observation for signs of withdrawal, plans should be made for the mother to stay in the hospital for that period of time. If obstetric reasons do not exist, the additional length of stay for the mother is fully justifiable on psychiatric grounds and should be part of the hospital's protocol for utilization review. Discharge of the mother before the fourth or fifth day or before the infant is discharged should require justification. A parental history of being abused as a child is a strong contraindication for early discharge, whether the mother has been drug dependent or not. At least 5 days in the hospital should be devoted to intensive work on parent-child bonding and training the parents to express their negative or angry feelings verbally rather than physically. Parent groups can be very effective for this

purpose and should continue to be encouraged for parents following discharge.

If the infant requires chemotherapy for the management of withdrawal, it may be necessary to discharge the mother before the infant. When feasible, orders should be written allowing mother and father 24-hour access to their infant. Their active participation in the infant's care needs to be expected and facilitated by *all* the nursery staff. Parents who appear to be relieved by or to welcome separation from their infant require particular attention and the issue of adoption or alternate parenting arrangements for the infant should be raised.

It has been noted from clinical experience that post-partum depression is not common in drug-dependent mothers. If it occurs during detoxification from methadone, the depression may be associated with attempts at too rapid withdrawal. An increase in the mother's methadone dose, followed by a slower rate of withdrawal, should be tried before giving antidepressant medication.

SUMMARY

The time between admission for delivery and discharge from the maternity ward is one of unusual crisis for a drug-dependent woman and her immediate family. The experiences which occur during that period may have a profound effect on the woman and on the future care her child receives. During this critical time the physician and maternity ward staff need to pay particular attention to:

1. Establishment of trust between the patient and the medical staff.
2. The development of parent-child bonding.
3. Demonstration and instruction in parenting skills.
4. Psychotherapeutic support from the mother's addiction treatment program.
5. Development of a good working relationship between the parents and the medical personnel who will be providing ongoing pediatric care.

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CHAPTER V

Management of the Newborn

GENERAL EFFECTS OF NARCOTIC AGENTS ON THE NEWBORN

The fetus of the pregnant woman who uses narcotic, sedative-hypnotic, psychotomimetic, or stimulant drugs is inevitably exposed to these drugs and thus to the possibility of their toxic or addicting effects. This is true whether the drugs are abused or medically prescribed. Effects which have been observed include those influencing fetal growth and maturation and those producing dependence and withdrawal (see chapter II).

Low birth weight, premature, and intrauterine growth retarded infants are common among heroin-addicted mothers (26,41). Infants of mothers on methadone maintenance have higher birth weights and greater gestational ages, although the mean weight is still less than among nondrug-dependent controls. Higher birth weights are associated with longer periods of methadone maintenance and more prenatal visits (20,42). It is unclear whether the difference in birth weight is related to direct effects of the drugs or to improved medical care and lifestyle associated with methadone maintenance.

Premature infants of heroin addicts have a lower than expected incidence of respiratory distress syndrome (10). There is conflicting evidence from animal studies as to whether narcotics have a direct effect on pulmonary maturation (35,39). It is likely that some of the stresses accompanying addiction in pregnancy are responsible for an acceleration of pulmonary maturation through the mechanism of enhanced endogenous steroid secretion (12).

A lower incidence and severity of neonatal jaundice have also been reported among infants of heroin addicts (28). However, it is not clear whether this is a direct effect of intrauterine exposure to narcotics which are not effective enzyme inducers or due to the influence of other maternally abused drugs—primarily barbiturates—on the enzymes involved in bilirubin metabolism.

NEONATAL NARCOTIC ABSTINENCE SYNDROME

Signs and Symptoms

The infant who is chronically exposed to narcotics *in utero* is abruptly removed from his/her source of drugs at the time of birth. If a physiologic dependence on these drugs has developed, abstinence symptoms may be expected to ensue. In reported studies, between 60 and 90 percent of infants born to mothers with a recent history of narcotic abuse showed clinical signs of withdrawal (7a,34a,41).

The neonatal narcotic abstinence syndrome was described in the late 1950s, when the great majority of cases were due to heroin. Over the past decade, methadone has come into widespread use and has become the predominant drug responsible for withdrawal symptoms in neonates. By 1974, 75-80 percent of pregnant drug-dependent women in New York City were being treated with methadone alone or were using methadone in combination with heroin. Experience was similar at Philadelphia General Hospital, where 80 percent of drug-dependent women who delivered were taking methadone or combinations of methadone and heroin. Various reports have indicated some differences between heroin and methadone-exposed infants, although the general symptomatology is similar (14,19,20,34b,42).

The signs and symptoms of neonatal narcotic withdrawal are listed in order of frequency in table 1. The most commonly observed signs are tremors, high-pitched cry, sneezing, increased muscle tone, frantic sucking of the fists, and regurgitation.

Tremors are characteristically coarse and flapping. Other abnormal movements include myoclonic jerks, which are asymmetrical, sporadic, and more apt to occur when the infant is in a drowsy state. The significance of these is unknown, but they appear to be more frequent than in normal infants and more frequent in the methadone than in the heroin group (32). Convulsions may also be seen, but it must be stressed that these are rare in heroin withdrawal (18,32,41). Various reports suggest that convulsions are more likely to occur in infants withdrawing from methadone than from heroin (19,42). Unsuspected withdrawal from barbiturates, alcohol, or sedative-hypnotics may be responsible for seizures seen in some infants known to be withdrawing from narcotics.

Hyperactivity and irritability are often pronounced, accompanied by a shrill, high-pitched, and/or protracted cry. Excessive movement against the bedclothes leads to skin abrasions, especially on knees, toes, elbows, and nose. Severely affected babies are very

TABLE 1. Signs and symptoms of neonatal narcotic abstinence in order of frequency[1] (N=138)

Symptoms	Frequency (percent)
Tremors: mild/disturbed	96
mild/undisturbed	95
marked/disturbed	77
marked/undisturbed	67
High-pitched cry	95
Continuous high-pitched cry	54
Sneezing	83
Increased muscle tone	82
Frantic sucking of fists	79
Regurgitation	74
Sleeps less than 3 hours after feeding	65
Sleeps less than 2 hours after feeding	66
Sleeps less than 1 hour after feeding	58
Respiratory rate greater than 60/minute	66
Poor feeding	65
Hyperactive Moro reflex	62
Loose stools	51
Sweating	49
Excoriation	43
Mottling	33
Nasal stuffiness	33
Frequent yawning	30
Fever less than 101 degrees	29
Respiratory rate greater than 60/minute & retractions	28
Markedly hyperactive Moro reflex	15
Projectile vomiting	12
Watery stools	12
Fever higher than 101 degrees	3
Dehydration	1
Generalized convulsions	1

[1] Observations made at Philadelphia General Hospital, 1974–1976.

difficult to comfort and hold themselves stiffly rather than cuddling against the mother or other caregiver. Sleep patterns are disturbed, with much less sleeping time than in normal infants.

Tachypnea frequently accompanies narcotic withdrawal and may persist for a week or more. The tachypnea (average 70 per minute) is on a central basis and results in respiratory alkalosis (11). Nasal congestion may cause some discomfort, mild retractions, and sneezing.

Feeding problems often complicate neonatal withdrawal. The babies suck greedily on fists or nipple, but the sucking pattern is

disorganized and poorly sustained so that intake may be inadequate (22). In addition, many babies regurgitate or vomit. As in adult withdrawal, there is an increase in intestinal peristalsis with resultant frequent small stools and, occasionally, excessive loose stools. The symptomatic infant has increased energy expenditure, so that some fail to gain weight well regardless of caloric intake.

Miscellaneous symptoms include profuse sweating and excessive yawning. A few infants show temperature elevations above 101 degrees Fahrenheit.

The onset of heroin withdrawal symptoms in the large majority of cases is between 4-24 hours of age, and is unusual after 72 hours (41). An occasional infant is already symptomatic at the time of delivery. Most methadone withdrawal appears within the first 2 or 3 days of life, although there are reported cases of onset delayed as long as 2 weeks or more (19,23). In most of these cases, there have actually been minor symptoms in the first week, with a later exacerbation. While methadone may be responsible for such late-appearing symptoms, it is important to remember that other drugs, such as barbiturates or diazepam, may also be involved (see below and chapter II).

It is reasonable to expect the incidence, time of onset, and severity of neonatal withdrawal to be related to the amount and type of the mother's drug intake, and the amount and time of her last dose before delivery. However, these correlations are difficult to make because of unreliability of drug intake histories and possibly because of poorly understood individual variability.

Time of onset was correlated with plasma level in a study of methadone disposition in 27 neonates from mothers maintained on daily doses of 10 to 100 mg of methadone (mean 35 mg/d) (36). Withdrawal symptoms did not occur at plasma levels greater than 0.06 μg/ml. Mean maternal plasma level in this study was 0.16 μg/ml, with mean neonatal plasma level 0.07 μg/ml in the first hour of life. Plasma half-lives ranged from 16 to 25 hours in the infants. Maternal dosage levels were not found to be predictive of withdrawal symptoms in the infants. However, plasma concentration and rate of fall of plasma level did correlate with the onset and severity of withdrawal. The most severe symptoms were seen in infants with the most rapidly decreasing plasma level of methadone. It was felt that wide individual variation in methadone disposition in the maternal-fetal unit and in the neonate account for the observed clinical differences in response to narcotic withdrawal. It is not known how long it takes for methadone acquired in utero to be completely cleared from the body of a neonate.

In some infants, a subacute abstinence syndrome persists for a few weeks up to several months after acute symptoms have subsided (40). Manifestations include irregular sleep patterns, irritability, poor response to being held, sensitivity to noise and other stimuli, hyperphagia, and loose stools.

Diagnosis

None of the signs of withdrawal is pathognomonic. However, the marked persistent irritability and crying of a moderately to severely affected baby are unusual in other neonatal conditions and the full symptom complex is highly suggestive to an experienced observer. If maternal drug intake is not already known, the appropriate history can usually be obtained if the mother is approached in a nonthreatening manner which indicates concern for her and her baby. The presence of needle tracks or unusual behavior by the mother may provide clues. It must be kept in mind that legitimate medical use of narcotics or other dependency-producing drugs by the mother may also give rise to withdrawal symptoms in her infant. Questions concerning nervousness or sleep difficulties during pregnancy will occasionally elicit a history of tranquilizer or barbiturate intake.

Analysis for psychoactive or dependence-producing drugs should be performed on urine from both mother and infant when the diagnosis is suspected. Urine testing may provide evidence of multiple drug abuse confirming the diagnosis. It must be emphasized, however, that a maternal urine negative for drugs does not rule out the possibility of drug withdrawal. The interval between last dose of a drug and specimen collection may be too great or the urine so dilute that urine concentrations are too low for the sensitivity of the testing method being used.

Differential Diagnosis

Systemic Disorders

It is important to consider other diagnostic possibilities and to remember that these may coexist with narcotic withdrawal. A tremulous baby should be investigated for hypoglycemia and hypocalcemia. If convulsions occur, other etiologies should always be sought, particularly meningitis, metabolic disturbances, and intracranial hemorrhage, as well as withdrawal from barbiturates, tranquilizers, or sedative-hypnotics. Stool cultures should be ob-

tained if there are loose stools. Fever should never be dismissed as secondary to withdrawal but investigated as in any other infant with appropriate cultures and blood counts. While neonatal hyperthyroidism is rare and usually associated with a clearcut history of maternal disease, it is one of the few conditions that can mimic the withdrawal syndrome's marked irritability and hyperactivity, along with tremors, sweating, sleeplessness, and loose stools.

Alcohol-Barbiturate-Sedative Withdrawal

The most important differential diagnosis in the narcotic abstinence syndrome is neonatal withdrawal due to barbiturates, tranquilizers, or sedative-hypnotics. In general, the symptomatology is very similar. The choice of medication for optimum treatment, however, will differ (see below). Therefore, a carefully taken history and testing of urines from mother and infant are very important to ascertain whether there is dependency on barbiturates or other drugs. Withdrawal from barbiturates or tranquilizers may be delayed, so that an exposed infant should be observed closely for up to 2 weeks. Chronic heavy alcohol use by the mother may, in addition to possible teratogenic effects, also result in a neonatal abstinence syndrome (17,31,32a,33).

MEDICAL COMPLICATIONS ASSOCIATED WITH NEONATAL NARCOTIC DEPENDENCY

Although tachypnea, sometimes associated with retractions, is a common symptom of withdrawal occurring in the absence of respiratory disease, the nursing staff should be alert for other signs of respiratory distress. The infant of the drug-dependent woman is at increased risk for meconium aspiration syndrome which may be complicated by the development of pneumothorax. Intrauterine pneumonia due to an ascending vaginal infection may occur, or feeding difficulties (vomiting, regurgitation) may lead to as aspiration pneumonia. Tachypnea, particularly if associated with other signs of respiratory distress, should be investigated with x-rays, blood gases, and other appropriate laboratory studies.

Since narcotic-dependent women have an increased incidence of venereal disease and hepatitis, the mother's history should always be carefully checked and laboratory tests obtained. Their infants should always be screened for congenital syphilis. Maternal biologic false-positive tests for syphilis are not uncommon, even when the mother has been treated prenatally. In this case, treatment of the

infant may not be indicated, but all those involved in followup care should be apprised of the situation so that close monitoring of the infant is accomplished during early infancy.

If the mother's history includes hepatitis and/or abnormal liver function studies, and/or there are clinical signs in the infant suggestive of liver disease (i.e., hepatomegaly, jaundice), liver function studies and hepatitis-associated antigen should be checked in the infant.

TREATMENT OF NEONATAL NARCOTIC WITHDRAWAL

Delivery Room Management

If the infant is depressed, usual resuscitative measures should be taken, but use of narcotic antagonists should be avoided for they may precipitate abrupt onset of severe withdrawal symptoms which are difficult to control.

Narcotic-dependent mothers have a high incidence of meconium-stained amniotic fluid (21), which is especially true of street addicts, possibly reflecting stimulation of fetal peristalsis during periods of withdrawal when drug intake is erratic. Asphyxial stresses during labor, to which the growth-retarded baby is particularly vulnerable, may also cause the passage of meconium. If there is recently passed meconium, prompt visualization of the vocal cords with a laryngoscope and direct suction of the airway reduces the likelihood of meconium aspiration.

Neonatal Period

The neonate's prognosis for recovery from withdrawal is good because he/she is only physically dependent. Since not all infants of addicts have withdrawal symptomatology, prophylactic drug therapy is not recommended. The narcotic-exposed infant should be observed in the hospital for at least 5 days. Even if he/she is still symptom-free at that time and evaluation of home and mothering capability have been adequate to permit discharge, observation at close intervals should be continued. If there has been polydrug abuse, a longer period of observation (7-10 days) in the hospital is advisable. In any case, a home visit or return appointment should be made within a few days after discharge and the mother alerted to the possibility of late onset of withdrawal signs.

If symptoms do appear, simple, nonspecific measures should be instituted, such as gentle infrequent handling, swaddling, and demand feeding. If symptoms progress, a decision must be made concerning drug therapy and readmission.

Pharmacologic Considerations

Indications for treatment, dosage schedules, and duration of treatment courses have varied widely in different hands, with some of this variation undoubtedly due to observer difference in judging severity of symptoms (2,7a,18,27,34b,36a,41). In order to improve the objectivity of these judgments, some workers with considerable experience in this field have devised neonatal abstinence scoring systems (8,13,24). One scoring system is illustrated in appendix A. Such a symptom-rating scale has been found very useful as a research tool and treatment guide in experienced hands (8). If a hospital has sufficient nursing staff that can be trained to use this method of recording symptoms, the observation of the course and response to treatment can be facilitated greatly. As a general guide, if, in spite of nonspecific measures, babies have difficulty feeding, diarrhea, marked tremors, and irritability even when undisturbed, or cry continuously, they should be given medication to relieve discomfort and prevent dehydration and other complications. Dosage must be regulated so that symptoms are minimized without excessive sedation.

Several drugs have been used in the treatment of neonatal narcotic withdrawal that appear to be effective in relieving symptoms, but there has been little controlled comparison of their safety and effectiveness. The agents *most commonly* employed have been camphorated tincture of opium, U.S.P. (paregoric), phenobarbital, chlorpromazine, and diazepam. Methadone has been used very little, because its pharmacology in the neonate has not been studied.

Paregoric

Paregoric has been used for over 70 years, with the rationale that narcotic withdrawal symptoms are most specifically relieved by narcotic substitution, with gradual reduction in dosage under careful control (table 2). It is not necessary to obliterate all symptoms. Mild tremors frequently persist with a dose sufficient to restore comfort and adequate sleep and feeding behavior. Constipation and lethargy may indicate overdose. Evidence that this form of therapy is more likely than others to restore normal physiology is provided

TABLE 2. Suggested dosage regime for treatment of withdrawal

An abstinence scoring system may be used to regulate dosage (24a,29):

Paregoric:

(a) 0.2 ml. p.o. per dose q. 3-4 hr., increased as necessary by 0.05 ml. per dose until symptoms are controlled.
(b) If symptoms are still not controlled at 0.75 ml. dose, the possibility of withdrawal from other drugs not relieved by narcotics should be considered. In this case or if seizures are present, phenobarbital should be added in a dose of 5 mg/kg/day in three divided doses. Observe carefully for oversedation and, if necessary, decrease paregoric dose.
(c) Maintain stabilizing dose for 5-7 days, then decrease individual dose by 0.05 ml. daily until discontinued. If moderate to severe symptoms recur as dose is being tapered, return to previous day's dose. Mild symptoms, especially tremors, may recur and are not an indication to raise the dose as long as feeding, weight gain, and rest are adequate.

in studies of sucking performance. Sucking, which is disorganized in infants undergoing withdrawal, was found to be much closer to normal among paregoric-treated infants than among those treated with phenobarbital or diazepam (22). Paregoric provides a conveniently dilute form of opium, which facilitates giving small doses to infants. A theoretical drawback of paregoric is its formulation, which includes small amounts of camphor (a central nervous stimulant) and benzoic acid, which is capable of competing with bilirubin for albumin binding sites. A preferable preparation would be tincture of opium. *The U.S.P. tincture is a 10 percent solution (equivalent to 1.0 percent morphine, i.e., 10 mg/ml) which should be diluted 25-fold to yield a concentration similar to that of paregoric (0.4 percent opium or 0.04 percent morphine, i.e., 0.4 mg/ml) for ease of administration. Unfortunately, dilute tincture of opium is not readily available in most hospital pharmacies, but could be made so with little difficulty.* Paregoric has relatively few side effects. It is particularly effective in relieving bowel hypermotility but overdosage may result in constipation.

Phenobarbital

Phenobarbital has been used extensively for neonatal narcotic withdrawal and does indeed suppress major symptoms, although it is not readily available in most hospital pharmacies, but could be ever, by a nonspecific central nervous system depression which may have other undesirable side effects. Studies have shown that some infants are not fully controlled even at doses which produce plasma

TABLE 3. Suggested phenobarbital dosage regime for treatment of withdrawal (34)

(a) Loading dose of 10 mg/kg/day in three divided doses, for 1 day, followed by—
(b) 5 mg/kg/day in three divided doses. This dose is usually adequate but may need to be adjusted up or down for inadequate control or excessive sedation.
(c) Tapering of dose should be done slowly after at least 7 days on a stabilizing dose.

levels considered to be in the toxic range (34). Phenobarbital is the drug of choice for treatment of withdrawal from barbiturates, alcohol, and sedative-hypnotics (tranquilizers) which show cross tolerance with barbiturates, and which do not respond to narcotics (table 3).

Chlorpromazine

Chlorpromazine has been used since 1959, following reports of its use in adults. Although soon abandoned as ineffective for adults undergoing withdrawal, a large number of infants have been treated with it. Chlorpromazine appears to suppress the major signs of withdrawal in infants. However, the use of a drug with such widespread and incompletely understood effects on behavior as well as on cardiovascular, endocrine, and central and autonomic nervous systems is questionable. Metabolism and excretion of chlorpromazine are complex and may be unusually prolonged. Metabolites of chlorpromazine have been found in the urine of adults as long as 18 months after discontinuation of the drug (16).

Diazepam

Recently diazepam has been advocated (27) and reported to be effective in intramuscular doses given at 8-hour intervals of 1.0 mg for mild, 1.5 mg for moderate, and 2.0 mg for severe withdrawal. Diazepam appears to offer little advantage over other drugs for neonatal withdrawal and has some occasionally serious drawbacks. Recent studies have demonstrated a limited capacity to metabolize and excrete diazepam in premature and full-term newborns, resulting in prolonged persistence of the drug in blood and other tissues compared to older children (25). There is a theoretical risk of bilirubin displacement from albumin binding sites by benzoate, which is present in the injectable form of diazepam (3,37). Bradycardia and respiratory depression have occurred following intra-

muscular or intravenous use of diazepam. Some infants on diazepam have become obtunded and have shown reduced sucking activity. In one study, convulsions were seen more often in a group of infants treated with diazepam than in those treated with paregoric (14).

Whatever drug is used, duration of therapy varies, according to the severity of withdrawal symptoms, from 5 or 6 days to as long as 2 months (9). The objectives of drug therapy are to control symptomatology so that the infant sleeps or rests comfortably between feedings, takes in calories sufficient for weight gain, and has a state of consciousness as normal as possible.

PROMOTING MATERNAL-INFANT ATTACHMENT

Finnegan and MacNew (9) suggest the following from their experience with several hundred drug-dependent mothers:

Maternal attachment begins long before the baby's birth and is a developing process throughout pregnancy. Parental attachment to a wanted child may start when a couple first plans a pregnancy, be strengthened by such events as coitus, the first missed menses, a positive pregnancy test, quickening, the first fetal heart sounds, and probably escalates during labor and delivery when both parents reap the product of their conception. For the addict, however, the events that normally strengthen the maternal claiming process can be experienced as negative reinforcements (21a).

Her most important person is often another addict, who places added socioeconomic pressures on her. Her financial stress increases as her source of income is interfered with. In considering her future, she may see the infant as simply one more burden. Some mothers have considered their pregnancies and their infants as punishment for their past lifestyles.

After the infant's birth, the most vital nursing responsibility is to foster a healthy maternal-infant attachment or to help the mother make a clear decision whether to release the infant for adoption so that it can be taken into a healthy family. Nothing offers more for these two people than their relationship with each other. Yet, in most hospitals, the mother and infant are separated shortly after birth. Doctors and nurses often assume that this mother is incapable of caring for her infant, and the separation of mother and baby may be prolonged because of the treatment each requires.

To stimulate maternal attachment, the first step is to leave the baby in its mother's arms for an hour after delivery, if conditions

permit. The mother and father should be encouraged to enter the nursery to see and touch the newborn. If this is delayed, the time when they are physiologically and psychologically ready may not come again.

This mother's presence in the nursery may be a trying experience for the nursing staff. Infinite patience and understanding are required. The addicted mother is often quick to voice her complaints about her baby's medical and nursing care. A search for the message behind these accusations is important. Is the mother really saying that there is something grotesque, unlovely, and precarious in her baby and therefore she, as a mother, must be inadequate and repulsive? As long as these feelings exist, she does not have a

TABLE 4. Assessment of home situation, addicted mother[1]

Mother's history:
Maternal age (adverse: less than 18 years)
Other pregnancies and outcome
Psychiatric diagnoses, hospitalization
Drug abuse history:
Duration (adverse: prolonged history)
Type(s) of drug
Dose and/or cost of street drug habit
Drug treatment program:
Quality of program—comprehensive services?
Voluntary enrollment? Reason related to pregnancy?
Length of time in program?
Compliance with program (adverse: continued use of street drugs)
Current pregnancy:
Planned or desired?
Prenatal care (adverse: none, late, or sporadic)
Expectations for infant realistic?
Readiness for baby, supplies, etc.
Family and environment:
Experience with previous children (adverse: need for placement)
Relationship to father of child or other male figure
Availability of other stable family members (adverse: drug abuse in other members of household)
Source and inadequacy of income
Behavior in clinic or hospital:
Behavior toward infant—handling, feeding, comforting
Mother or father under influence of drugs at time of visits?
Abusive or inappropriate behavior
Frequency of visits
Willingness to become involved in parenting instruction and followup program (see also chapter VI)

[1] Adapted from a protocol prepared by Ms. Linda Halpern, M.S.W., Pediatric Project, Bellevue Hospital, New York, New York.

gratifying experience with her child and the mother-child separation is perpetuated.

If nurses and physicians are unable or unwilling to bridge this gap, the separation process accelerates. Feelings intensify in both mother and baby and the end result will be aversion and avoidance with devastating effects for the infant. Successful care in the neonatal period, then, includes the following:

1. Continual consideration for the mother, remembering her founded and unfounded apprehensions.
2. Continual communication about the infant's progress, condition, and management. This will include honest, straightforward answers to the mother's questions about the baby. Sufficient time must be spent with the parents to help relieve their anxiety and guilt (see chapter IV, p. 57).
3. Encouragement of the mother to visit the nursery often to see, hold, and assist in care; staying with the mother to assist her in overcoming her sense of inadequacy.
4. Encouragement of the baby's father and other important people to visit the mother for the purpose of providing her with support.
5. Frequent communication with all health team members to provide continuity of care during and after hospitalization of mother and baby.

All nursing measures that increase parental-infant satisfaction can be considered preventive as well as therapeutic since they maintain attachment, prevent avoidance behavior, and aid in the development of sound nurturing. (See the section Training in Parenting Skills in chapter VI, p. 87, see chapter IV for discussion on breast feeding and psychological factors in the immediate post-partum period.)

DISCHARGE FROM THE HOSPITAL

Plans for discharge and further care of the infant of an addict mother represent a much greater challenge than the management of the child's withdrawal symptoms.

Of first importance is evaluation of the family's ability to provide a safe environment for the child. When the mother is enrolled in a comprehensive treatment program, this assessment should be done before the birth of the baby. The most difficult and potentially most risky situation is that of the woman who has not sought prenatal care, and has been a "street addict" throughout her pregnancy (36a). Some of the factors which should be considered in deciding whether the child should be released to the mother are outlined in table 4. (Also, see chapter VI, p. 84.)

In several States, reporting of infants of addicted mothers to a child protective agency is mandated under a child abuse statute. Specific provisions of the laws and their interpretations differ and should be looked into in each locality (see chapter VII).

PROGNOSIS

With appropriate diagnosis and management, there is no significant neonatal mortality associated with acute narcotic withdrawal. However, experience in several centers suggests an increased incidence of sudden infant death syndrome (SIDS) in the first few months of life among infants of addicts (13a,33a). It is difficult to confirm this impression, as no adequate comparisons have been made between infants of narcotic addicts and those of nonaddicts from comparable socioeconomic strata. The impressive prevalence of polydrug abuse, including alcoholism, in these populations makes even more difficult the evaluation of the role of narcotics per se.

Followup of significant numbers of infants of drug-dependent mothers has been possible only since the advent of methadone maintenance programs, and, as yet there is limited information concerning long-term outcome of these children. Special followup is indicated as for other children who were high risk at birth (see chapter VI, p. 89).

The prolonged subacute symptoms manifested by some infants create special problems. An irritable, difficult to soothe, demanding baby may be seen by the mother as rejecting her, or as a reflection of her failure in mothering. A great deal of explanation and support is usually necessary in such cases. Instruction in swaddling, prone positioning, use of a pacifier, avoidance of excessive light, noise, and sudden movement are helpful, as is reassurance that such behavior is expected and self-limited, even if prolonged. It is rarely necessary or advisable to consider sedative medication for the infant at home. If complaints are severe or if the infant is not gaining well, it may occasionally be necessary to readmit the infant to the hospital for observation. Personnel in the mother's and infant's followup programs should be alert to indications of potential child abuse, make home visits to support the mother, clarify the situation, and take appropriate steps to protect the mother and child if necessary.

Long-term followup is essential for these children, including testing for developmental or learning problems as they mature to school ages (see chapter VI, p. 89).

It is apparent that uncertainty exists as to the potential for organic functional hazards to the fetus from the use of narcotic drugs by the mother. Furthermore, there are insufficient data on the long-term effects of maternal drug usage and passive narcotic dependence and withdrawal in the developing infant and child. Controversy exists on how best to prevent and treat the adverse sequelae of addiction in mother and infant. Nonetheless, initial data from the programs that have provided comprehensive care for addicts have shown a significant reduction in morbidity and mortality to both mother and infant (4,5,6,30).

Because of the lack of prenatal care in the street-addict population, most of the women are considered high risk and will deliver an infant who has an elevated probability of neurological sequelae, because these women have a high incidence of complications in pregnancy including premature labor. It is known that low birth weight infants will contribute heavily to the number of infants who will eventually be classed as mentally retarded (I.Q. of 70 or below), as well as to the number of those who will have great difficulty in school because they are "poor learners" (1). These handicapped individuals will be unable to compete fully in our increasingly complex society. The majority of deaths among newborn infants are associated with low birth weight. The death rate of the low weight neonate is markedly higher than that of the full-size infant born at term. Moreover, the incidence of cerebral palsy, mental deficiency, and lethal malformations in undersized infants is greater than that seen in the full-size infant. Emotional disturbances, social maladjustments, and visual and hearing deficits are also multiplied. If we do not begin to cope with this population in terms of prevention as well as treatment and rehabilitation, with the increasing number of pregnant drug-dependent women we can expect an increasing need for custodial facilities for their mentally and neurologically deficient infants. The medical and custodial costs for these individuals are incalculable (1).

SUMMARY

In summary, the following recommendations are given for successful management of infants of drug-dependent women:

(1) In order to maintain a stable and protective intrauterine environment for the fetus, pregnant women who abuse drugs must be designated "high risk" and they warrant specialized care which includes addictive and obstetrical management and psychosocial counseling.

(a) Treatment for the addiction may involve voluntary drug-free therapeutic communities, methadone detoxification, or methadone maintenance (see *Characteristics of an Addiction Treatment Program*, p. 46).

(b) The pregnant drug-dependent woman should be evaluated in a hospital or outpatient setting where a complete history and physical examination may be accomplished and laboratory tests carried out to evaluate her overall health status. Methadone maintenance (less than 40 mg/day) with substantial medical and paramedical support should be instituted. Doses as low as 40 mg/day are considered desirable, but too low a dose may result in supplementation with street drugs and should be avoided. Dose maintenance can best be accomplished by increasing the psychosocial support available to the woman.

(c) Detoxification, if requested or necessary, should preferably take place between the 14th to the 28th week of gestation and be extremely slow (5 mg reduction every 2 weeks). Pregnant women addicted to barbiturates or major tranquilizers along with opiates should be detoxified during the second trimester in a very specialized detoxification center. For most patients, methadone maintenance is preferable during pregnancy to detoxification from narcotics, because the recidivism rate is almost 100 percent, with attendant dangers to the fetus of erratic drug levels, multiple drugs, and contaminants.

(d) Psychosocial counseling should be given by experienced social workers or counselors who are aware of the medical needs, as well as the social and psychological needs of this population.

(e) Social and medical support should not end in the hospital setting, but an outreach program, incorporating public health nurses and community workers, should be established.

(2) Management of the passively drug-dependent newborn should encompass the following:

(a) Admitting the infant to special care nursery.

(b) Testing for drugs in urine of mother (on admission) and infant (first day of life).

(c) Promptly recognizing abstinence symptoms.

(d) Delineating other neonatal conditions with similar symptoms that may coexist with abstinence:

1. Hypoglycemia
2. Hypocalcemia

3. Intracranial hemorrhage
4. Infection (sepsis, meningitis)

(e) Monitoring respiratory rate, heart rate, temperature, intake and output, daily weight, progression of abstinence symptoms.

(f) Providing supportive treatment (swaddling, hydration, demand feeding, minimizing trauma to skin, suction when necessary).

(g) Providing pharmacological treatment of abstinence.

(h) Assessing ability of mother to care for infant after discharge from the hospital by recommended parameters (see table 4).

(i) Assuring mechanisms by which to follow and supervise the infant's course after discharge from the hospital.

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CHAPTER VI

Continuing Care of Mother and Infant

INTRODUCTION

Pregnancy and delivery in drug-dependent women are the small but highly visible portion of a much larger problem. The difficulties in providing prenatal and obstetric care are relatively simple by comparison with the changing complexities of the child's growth and development either in the context of parental drug-dependency or foster care. These problems are rarely medically circumscribed and often defy easy solution. Even though some of the following approaches may sound simple and straightforward, they are much more difficult in application.

THE PHYSICIAN'S ROLE

The physician's role does not stop with the provision of medical care. If it does, it is likely to be delivered intermittently in emergency rooms where too little can be done too late. This is not to imply that the physician should take on responsibility for the overwhelming array of social, economic, and psychological factors involved in addiction (see chapter III, p. 41).

There are two contributions the physician can make in addition to those provided by his medical skills. The first is dependability and stability in a treatment relationship. The physician's continued willingness to provide medical care for one or more persons in the addicted woman's family can have a stabilizing effect on the entire family unit. Sanction and a stable role model are also provided by the physician for paraprofessional staff who can play an important role in treatment. Counselors without professional training who were formerly drug-dependent themselves are rarely well accepted in the health care delivery system. Yet these people can be invaluable to physicians, nurses, and other professionals, often communicating better with patients and therefore serving as interpreters.

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They provide hope for depressed women who do not believe their lives can change or improve. Most importantly, they are effective in controlling disruptive behavior in drug-dependent patients (see chapter III, p. 43).

The second aspect of the physician's role is to act as a catalyst in problem-solving. The physician's direct problem-solving skills are always useful. Frequently these can be applied through nursing and paraprofessional staff. On rare occasions, physician interest in the health and welfare of the child or other family members will prod a previously unresponsive part of the health care, educational, welfare, or legal systems to move again. There are times when the child and his/her parents can benefit from aggressive advocacy of their rights both as individuals and as a family unit. Continued support by the physician of attempts to make positive changes increases the likelihood that the changes will occur.

CUSTODY OF THE INFANT

The question of whether the parents can provide adequate care for the child does not stop with the decision made following delivery (see chapter IV, p. 60 and chapter V, p. 75). It can be raised at each new phase of the child's development or whenever there is evidence of child abuse or neglect (3.7). The first half to 1 year of life is the easiest for a drug-dependent mother to deal with. Perhaps the infant's clear dependence on someone to meet its needs touches a responsive chord of identification with similar feelings within the mother. Problems in parenting become more obvious as the growing child begins to be able to individuate himself from his parents both physically and verbally.

Whenever the question of child custody arises, it requires serious consideration. Factors to be weighed include:

1. *Maternal wishes.* If these are strongly in favor of retaining the infant, she may be motivated to accept treatment and training in parenting skills.
2. *The mother's actual ability to care for the child.* Her behavior with the child and with children in the past are indicators of potential or real ability to become an effective parent.
3. *The family's wishes and the home situation.* Support available for the mother and child may be critical factors in making effective parenting possible. The father, whether biological, psychological, or merely legal, must be included in any custody considerations. If he is interested in being a parent, anything that can be done to strengthen him in that role will be bene-

ficial. Grandparents and other relatives are frequent providers of support to the family unit or of direct care for the child.

4. *The mother's treatment status, which may be the most important factor in making a custody decision.* If she is not receiving treatment for her addiction or is very negative about that treatment or about discontinuing illicit drug use, then there is little reason to believe that any improvement in her parenting abilities will take place in the future. If a decision is made to place the child in a different setting, care needs to be taken that this move does not abruptly terminate the woman's efforts to get treatment for her addiction.

In practice, it is more likely that a mother will be positive rather than negative in the above four factors. Fortunately, there are relatively few mothers who do not want their child, have never raised children, have no family support, or live with active drug users, and refuse treatment for their addiction.

The legal and moral responsibilities in making a decision about who will raise a child are so great that they should be shared, rather than be made by one individual. A team of individuals who are familiar with the mother and the above factor can facilitate constructive decisionmaking. The danger of one person deciding about removing the child from the mother is that there is a strong possibility that negative emotion about addicted mothers may lead to a stereotypic rather than an individualized decision. Despite their similarity in drug use, the population of addicts is very heterogeneous.

Individuals with experience in this field can identify with Blinick's statement that "the mothers on methadone maintenance seem highly motivated to provide their offspring with maternal warmth and love, and frequently express a great desire to nurse their children" (1). Part of the treatment team's task in these cases is to facilitate maternal exposure to training and experience which will help these mothers develop the needed skills for expressing maternal warmth and love in keeping with the developmental needs of their children.

If the woman had been followed in a therapeutic community during her pregnancy and wishes to return, it is important to realize that infants and young children often thrive in such settings. They may benefit from the experience of living in a large and caring extended family represented by the therapeutic community. But experience with school-age children and adolescents in therapeutic communities is much less common and less clearly favorable.

If a decision is made to find alternate parenting resources, the physician should be prepared to encourage and support court

action. The preferable goal, in considering the best interests of the infant, is adoption. Foster home care should be viewed as a last resort and institutional care unacceptable. It is almost impossible to pay someone to replicate the care a parent would provide for his or her own child. Wilson et al. describe poor socialization as part of the long-term effects of drugs on infants born to heroin-addicted mothers (10). Most of these infants were raised in foster homes, a fact which may account better for the problem of poor socialization than does intrauterine exposure to drugs.

MAINTENANCE OF THE PARENT-CHILD BOND

No matter how strong the parent-child bond formed during pregnancy and following delivery may appear to be, it is fragile and may not survive in the environment to which the mother is discharged. It is essential that continued skillful emotional support and treatment be available following discharge from the hospital.

The fragility of the parent-child bond is not only due to environmental factors, but to psychological and interpersonal factors as well. Addicts are characterized by relatively weak commitments to enduring interpersonal relationships (9), and their experience in exploiting or manipulating others for the purpose of obtaining drugs may carry over into their interpersonal functioning. These lifestyle characteristics put a great strain on relationships between spouses as well as with the child. Reactions of anxiety and guilt can also be very disruptive of the parent-child relationship (2).

Both mother and child have strong needs for support and relief of tension. If the mother is receiving no emotional and social support herself, it will be very difficult for her to provide similar support for her infant. This will be particularly true if she has had no experience herself with effective parenting when she was a child. The materialistic and appearance orientation of many addicts may lead to parenting responses which emphasize providing food, clothing, and a "cute" appearance rather than meeting the child's psychosocial and developmental needs (9).

One of the many early signs of ineffective or weak bonding is the tendency to surrender parenting or caring functions readily, almost submissively, to others. An indication of this sign may be a mother who easily surrenders her infant to a doctor or nurse during examinations (5). Another sign of a problem in the relationship is the attribution of adult motives and capabilities to the child. When

a parent expresses a view that the child knows how the parent feels or is making its needs known for the purpose of becoming boss or manipulating the parent, then there is a real possibility that child neglect or abuse is either occurring or will occur in the future. The remedy in both cases is immediate involvement of the parent in experiential training in parenting skills, similar to the following.

Training in Parenting Skills

1. Supervised practice in *tender careful handling.* (See chapter IV, p. 54 under post-partum care, including table 1, p. 59, and chapter V, pp. 73-75). Parent-child contact forms the basis of the child's initial experience and lays the foundations for future skills in interpersonal relationships. Tender careful handling extends beyond infancy and includes talking to and playing with the child. Parents need to understand that stimulation and feedback are essential for optimal development of the central nervous system.

2. Observation and description of her infant's behavior as a basis for *understanding developmental stages.* The focus of training should be on the child's current developmental level and the one which follows it. Exposure to the children of other parents undergoing training will broaden the scope of developmental understanding. Toilet training may require particular attention. Parents have shown a tendency to start too early, sometimes before the end of the first year, and to use corporal punishment and expressions of disgust (9). The timing of the training in body control to coincide with maturational ability helps the child develop a sense of hope and competence, both of which are absent in most drug-dependent adults.

3. Practice in assertive or *responsible parenting.* Instead of surrending the infant to those performing services for it, such as the doctor or nurse, the parent can learn to facilitate the process while continuing to provide support for the child.

4. Practical help for feeding, behavioral, and other problems with the child should be offered. This will help develop the parent's own *problem-solving skills.*

5. The *value of the child's functioning* and performance in mastering motor, verbal, social, and adaptive skills should be emphasized as much more important than appearance.

6. *Feeding and nutrition* should be provided in response to the child's needs rather than the parent's convenience. Parents often have strongly held but erroneous opinions about food and feeding practices, based on their own experience. It should be emphasized

that while food may symbolize loving care, it is no substitute for it. Preventive medicine principles can be followed by teaching parents how to "fat-proof" their baby.

7. *Basic hygiene*, including care of the skin, hair, and teeth, will enable the parents to give their child a good start in learning to look after him/herself well.

A positive approach can have positive and beneficial effects. Silver et al. have described a family-maternity clinic for pregnant drug-dependent women in which 50 percent came with their spouses, 81 percent remained in the program after delivery, and 88 percent of the babies remained with and were cared for by their mothers (8). In addition, 40 percent of the women became abstinent in treatment following their delivery. The key to this and other successful programs appears to be the addition of a comfortable family atmosphere in which all members of the family unit feel welcome, combined with effective psychosocial supports, including family therapy. These are, of course, in addition to the provision of basic medical care.

Good advice and moralistic exhortations from the physician, no matter how well intentioned, are insufficient to alter embedded attitudes and deficiencies in early life experience in the parents themselves. Singer has described the problem well:

> . . . the babies were not considered individuals with their own rights, but objects possessed by the mothers, to be molded to comply with the mother's demands, rather than persons to be helped with the long-term tasks of growing up. The babies represented a set of mother's needs to be serviced in a certain way. Mastery of self and definition of self were being thwarted, however unintentionally (9).

PSYCHOLOGICAL BIRTH

There are formidable obstacles to psychological birth for the children in the family unit with one or more drug-dependent parents. The concept of psychological birth refers to the development within each child of a sense of personal identity. It is described by Mahler, a pediatrician-psychoanalyst, as "a slowly unfolding intrapsychic process referred to as the separation-individuation process" (6). She believes that psychological birth occurs to every infant in every culture and describes the following three or four stages:

1. (a) *Differentiation* occurs after the fourth month and is characterized by efforts on the baby's part to move its head and limbs away from the parent's body.

(b) *Practicing* of differentiation takes place between the seventh and seventeenth months as the infant develops the motor skills of crawling and walking which enable it to move even farther away from the parents.

2. *Rapprochement* occurs between 1½ and 2½ years, coinciding with the "terrible two's." This is the stage at which the child becomes aware of and disturbed by separateness and a loss of fusion with its parents, especially the mother. Separation is sought by the child, but rapidly followed by anxiety which may result in demands for the parent's constant attention. This phase is by far the most difficult for any parent and requires patience and tolerance which the addict mother is unlikely to have. Successful mastery of this phase requires parenting persons, especially the mother, who are emotionally available and accepting of the toddler's ambivalence.

3. *Consolidation of individuality* occurs in the third year and marks the end of the separation-individuation process. Mastery of the process occurs when the child has achieved object constancy and can remember the mother when she is not with him. It is at this point that the child can enter nursery school.

INFANT FOLLOWUP: WELL BABY CARE

It is extremely important to counsel the mothers in regard to appropriate and regular visits for their infants during the first few years of life. Immunization schedules are reviewed and the need for continual medical care for their infants is emphasized. Because the infants born to drug-dependent women should be considered as high-risk infants, medical followup is extremely important and services in addition to routine medical care are also advised (See chapter V, p. 76). Infants are generally seen once monthly in the first 6 months and every other month in the second 6 months. Neurological and developmental examinations should be accomplished at least at 1, 2, and 3 years of life. If the infants have been born prematurely or have had any difficulties other than withdrawal in the newborn nurseries, additional followup examinations by the ophthalmologist and audiologist are also indicated well before the child attends school.

In addition to medical services, it is extremely important for the social workers as well as public health nurses involved in the mother's care to become as supportive as possible around the issues of infant care. Home visits should be made to assure and to guide the mother in the care of her infant. With strong support from the

treatment team and with intensive psychosocial services during her pregnancy and immediately after delivery, the mother usually is prepared to cope more realistically with motherhood.

OTHER ASPECTS OF PARENTAL TREATMENT

Several other issues are important in the followup treatment of the pregnant drug-dependent woman. Help in *family planning* should be easily available (see chapter IV, p. 56). Ambivalence characterizes the drug-dependent woman's attitude toward birth control. Realistically she may want no more children, with the burden and inconvenience they represent. On the other hand, unconsciously she may wish to become pregnant and be a mother to demonstrate her ability to be a "normal" and "complete" woman. Counseling and peer pressure help resolve this conflict, usually in the direction of using birth control, having an abortion, or planning a wanted baby in the context of a new lifestyle oriented to human rather than drug-related values. A secondary goal of treatment in this area is to help the woman achieve a positive sexual identity with heterosexual satisfaction, if that is her interest.

Education and vocational counseling, including job finding, are usually an important part of treatment. The basic goal is to enhance the woman's competence in providing support for herself and her family in the community in which they live. The psychological result will be an increase in self-esteem and hope that other changes can be made. It is not important that the woman work. It is important that she feels good enough about herself to be emotionally available to meet the needs of her child. In this context, good day-care facilities are a very useful part of any program working with pregnant drug-dependent women.

Vocational assistance to the woman's spouse may be of as great a benefit as providing direct help to her. He will often be the key to her continued abstinence or drug use. His inclusion in all phases of medical and psychosocial treatment emphasizes the importance of a healthy intact family unit in which the child can grow and develop.

SUMMARY

Adequate treatment of the pregnant drug-dependent woman and her child should extend far beyond the post-partum period. The

treatment team can play a critical role in ensuring that treatment is adequate by providing medical services, continuity of stable, dependable care, sanction of paraprofessional and allied health counselors, and a sound basic knowledge of the developmental needs of the child, the mother, and the family unit to which they belong.

The task of changing absent or unhealthy living patterns into ones which will reduce the vulnerability of the infant to drug dependence or other emotional disorders as an adult requires patient, persistent, skilled effort. Any woman willing to undertake such a change should receive strong support and recognition of the courage required in the effort. She not only has to focus energy on giving up drugs, redefining social relationships, and working toward economic self-sufficiency, but she also has to provide emotional energy to meeting the needs of her child or children (4). It is small wonder that feelings of guilt and inadequacy are so common in these mothers (2).

Three years of abstinence from the use of psychoactive drugs and freedom from evidence of emotional disorder is used by the American Medical Association to define a successful response to the treatment of drug dependence. That time period is inadequate for the pregnant drug-dependent woman. She and her child should be followed for at least 5 to 6 years, until the child has successfully entered elementary school. It is useful to prepare the family for the possibility of long-term followup until the child is in adolescence. Only then will we be able to get information regarding the troublesome questions about the predisposition to drug abuse in later life due to intrauterine exposure to drugs and/or alcohol and whether our best efforts in treatment have any real long-term effect.

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APPENDIX A

Neonatal Abstinence Scoring System

Several neonatal abstinence scoring systems have been defined in order to monitor the passively addicted infant in a more comprehensive and objective way. A scoring system is essential in assessing the progression or diminution of symptomatology before, during, and after pharmacologic therapy. One scoring system is defined here and references to others are included in chapter V.

This abstinence score lists 21 of the most commonly seen symptoms in the passively addicted neonate born to the drug-dependent mother. Signs are recorded as single entities or in several categories if they occur in varying degrees of severity. See figures 1 and 2.

Each symptom and each degree of severity of each symptom have been assigned a score. The higher scores were given to signs or symptoms which were found in infants with more severe abstinence syndromes. The total score for the interval of measured infant behavior is added and listed at the bottom of the scoring sheet.

It should be emphasized that the scoring system is dynamic rather than static, that is, *all* of the signs and symptoms observed during the 2- or 4-hour intervals in which infant symptomatology is monitored are point-totaled for that interval.

DETERMINATION OF INTERVALS FOR SCORING

All infants born to drug-dependent mothers are assessed for withdrawal symptomatology by using the "Neonatal Abstinence Score" at 2-hour intervals for the first 48 hours of life (Figure 1), then every 4 hours thereafter (Figure 2). *If at any point the infant's score is 8 or greater (regardless of age), every 2-hour scoring will be initiated and continued for 24 hours from the last total score of 8 or greater.* If the 2-hour scores continue to be 7 or less for 24 hours, then 4-hour scoring intervals may be resumed.

DURATION OF SCORING

If therapy is not needed, the infant is scored for the first 5 days of life, at 4-hour intervals, unless otherwise ordered by the physician. If pharmacologic intervention is required, the infant is scored at 2- or 4-hour intervals

APPENDIX

FIGURE 1

NAME: _____

DATE: _____

NEONATAL ABSTINENCE SCORE

(First 48 Hours of Life)

SYSTEM	SIGNS AND SYMPTOMS	score	AM 2	4	6	8	10	12	PM 2	4	6	8	10	12
CENTRAL NERVOUS SYSTEM DISTURBANCES	High-Pitched Cry	2												
	Continuous High-Pitched Cry	3												
	Sleeps < 1 Hour After Feeding	3												
	Sleeps < 2 Hours After Feeding	2												
	Sleeps < 3 Hours After Feeding	1												
	Hyperactive Moro Reflex	2												
	Markedly Hyperactive Moro Reflex	3												
	Mild Tremors Disturbed	1												
	Moderate-Severe Tremors Disturbed	2												
	Mild Tremors Undisturbed	3												
	Moderate-Severe Tremors Undisturbed	4												
	Increased Muscle Tone	2												
	Excoriation (specify area): _____	1												
	Myoclonic Jerks	3												
	Generalized Convulsions	5												
METABOLIC/VASOMOTOR/RESPIRATORY DISTURBANCES	Sweating	1												
	Fever < 101 (99-100.8 F./37.2-38.2 C.)	1												
	Fever > 101 (38.4 C. and higher)	2												
	Frequent Yawning (> 3-4 times)	1												
	Mottling	1												
	Nasal Stuffiness	1												
	Sneezing (> 3-4 times)	1												
	Nasal Flaring	2												
	Respiratory Rate > 60/Min.	1												
	Respiratory Rate > 60/Min. with Retractions.	2												
GASTROINTESTINAL DISTURBANCES	Excessive Sucking	1												
	Poor Feeding	2												
	Regurgitation	2												
	Projectile Vomiting	3												
	Loose Stools	2												
	Watery Stools	3												
SUMMARY	TOTAL SCORE													
	SCORER'S INITIALS													
	INITIATION OF THERAPY: (↟)													
	INCREASE IN THERAPY: (↑)													
	DECREASE IN THERAPY: (↓)													
	DISCONTINUE THERAPY: (−)													

FIGURE 2

NAME: _____

NEONATAL ABSTINENCE SCORE

(Daily Score After 48 Hours)

SYSTEM	SIGNS AND SYMPTOMS	Score	Date: AM 2	6	10	PM 2	6	10	Date: AM 2	6	10	PM 2	6	10
CENTRAL NERVOUS SYSTEM DISTURBANCES	High-Pitched Cry	2												
	Continuous High-Pitched Cry	3												
	Sleeps < 1 Hour After Feeding	3												
	Sleeps < 2 Hours After Feeding	2												
	Sleeps < 3 Hours After Feeding	1												
	Hyperactive Moro Reflex	2												
	Markedly Hyperactive Moro Reflex	3												
	Mild Tremors Disturbed	1												
	Moderate-Severe Tremors Disturbed	2												
	Mild Tremors Undisturbed	3												
	Moderate-Severe Tremors Undisturbed	4												
	Increased Muscle Tone	2												
	Excoriation (specify area): _____	1												
	Myoclonic Jerks	3												
	Generalized Convulsions	5												
METABOLIC/VASOMOTOR/RESPIRATORY DISTURBANCES	Sweating	1												
	Fever < 101 (99-100.8 F./37.2-38.2 C.)	1												
	Fever > 101 (38.4 C. and higher)	2												
	Frequent Yawning (> 3-4 times)	1												
	Mottling	1												
	Nasal Stuffiness	1												
	Sneezing (> 3-4 times)	1												
	Nasal Flaring	2												
	Respiratory Rate >60/Min.	1												
	Respiratory Rate >60/Min. with Retractions	2												
GASTROINTESTINAL DISTURBANCES	Excessive Sucking	1												
	Poor Feeding	2												
	Regurgitation	2												
	Projectile Vomiting	3												
	Loose Stools	2												
	Watery Stools	3												
SUMMARY	TOTAL SCORE													
	SCORER'S INITIALS													
	INITIATION OF THERAPY: (↑)													
	INCREASE IN THERAPY: (↑)													
	DECREASE IN THERAPY: (↓)													
	DISCONTINUE THERAPY: (−)													

(depending on whether the abstinence score is less than or greater than 8, as described above) throughout the duration of therapy. Once therapy is discontinued, *if there is no resurgence in the total score* after 3 days, scoring may be discontinued. If there is a resurgence (i.e., an increase in the total score of 3-4 points) of symptoms, then scoring should be continued for a minimum of 5 days following discontinuation of therapy.

It should be noted that the infant is scored for the first 5 days of life (even though pharmacologic intervention may not be indicated), and for 3-5 days following the discontinuation of therapy because of the prolonged neonatal excretion rate of many of the maternally abused and/or therapeutic agents. Slow excretion of these drugs will often manifest itself in a delayed onset of withdrawal symptomatology. If delayed withdrawal occurs, the infant may be prematurely discharged from the hospital (i.e., before onset of withdrawal syndrome is recognized).

SOME POINTS TO REMEMBER WHEN USING THE SCORE SHEET

1. Include *all* the symptoms exhibited during the *entire scoring interval* (not just a single point in time).

2. Awaken the infant to elicit reflexes and specific behaviors being measured. ("*Sleeping*" should never be recorded for a scoring interval unless under extreme circumstances when the infant has been unable to sleep for an extended period of time: more than 12-18 hours.) If the infant is *crying*, he/she must be quieted before assessing muscle tone, respiratory rate, and the Moro reflex.

3. Count respirations for one full minute.

4. Score the infant if prolonged crying is exhibited (even though it may not be "High Pitched" in quality).

5. Take all temperatures rectally.

6. If infant is "sweating" because of conservative nursing measures (i.e., swaddling) alone, a point should *not* be given.

7. Use appropriate code (i.e., +, ↑, ↓, -) to indicate initiation, increase, decrease, and discontinuation of therapy during appropriate interval of time on the bottom of the score sheet.

8. When initiation of therapy is noted (i.e., "+"), identify the drug used (i.e., tincture of opium, paregoric, phenobarbital, thorazine, or valium) in the same space.

9. The first withdrawal score should be recorded at the *first point* on the score sheet following the infant's arrival in the nursery. This score reflects infant behavior in the interval from the infant's admission to that scoring point and may range from a 2-hour to less than 30-minute period of time. Following the first assessment interval, scoring should be performed at 2-hour intervals for 48 hours.

10. Most often it will be necessary to utilize two score sheets to accomplish charting for the first full 24-hour period of time. This will also be necessary throughout the second 24 hours of life.

Once the infant has been assessed at 2-hour intervals for 48 hours, the scoring should be initiated at the next point in time on the every 4-hours score sheet which permits no greater than 4 hours between scoring intervals.

NEED FOR PHARMACOLOGIC INTERVENTION USING A SCORING SYSTEM

A. No Therapy

Pharmacologic therapy is *not* indicated if consecutive total abstinence scores or the average of any three consecutive scores continues to be 7 or less. If pharmacotherapy is not indicated, the infant must be scored for a minimum of the first 5 days of life unless otherwise ordered by the physician.

B. Detoxification

The need for pharmacologic intervention is indicated when the total abstinence score is 8 or greater for three consecutive scorings (e.g., 9-8-10) or when the average of *any* three consecutive scores is 8 or greater (e.g., 9-7-9). Note that, once an infant's score is 8 or greater, the scoring interval automatically becomes 2 hours. Therefore, the withdrawing infant in the aforementioned situation would exhibit symptomatology which was out of control for no longer than 4–6 hours before therapy is initiated.

If the infant's total score is 12 or greater for two consecutive intervals or the average of any two scores is 12 or greater, therapy should be initiated at the appropriate dosage for that score before more than 2–4 hours elapse.

The total abstinence score also dictates the dose of the pharmacotherapeutic agent (i.e., the dose is titrated against the total abstinence score). The following table is suggested for the dosage schedules of each specific drug:

DOSAGE SCHEDULE ACCORDING TO ABSTINENCE SCORE

SCORE	Paregoric (#1) (tincture of opium)	Phenobarbital (#2)
8-10	0.8 cc/kg/day: 4 divided doses	6 mg/kg/day: 3 divided doses
11-13	1.2 cc/kg/day: 4 divided doses	8 mg/kg/day: 3 divided doses
14-16	1.6 cc/kg/day: 4 divided doses	10 mg/kg/day: 3 divided doses
17 or above	2.0 cc/kg/day: 4 divided doses	12 mg/kg/day: 3 divided doses

The total abstinence score has been categorized into ranges of scores indicating the severity of the withdrawal syndrome (i.e., the higher the score, the more severe the syndrome; therefore, the greater the dose of detoxicant needed to control the symptomatology).

The initial dosage indicated by the score range on the schedule should not be changed unless the abstinence score continues to indicate that the baby is not controlled (i.e., total scores continue to be 8 or greater) by that dose.

If the infant on therapy increases his/her abstinence score to the next level (e.g., 11-13), the drug dosage should be *increased* to the next level of drug therapy. Also, if an infant is started on therapy, that is, receives a dose appropriate to a certain score range for 48 hours, but *continues to exhibit a total score in the same range despite pharmacologic intervention*, then the dose should be increased to the next range until the total score is less than 8.

If an infant's score decreases to the next lower level (e.g., 11-13 range down to 8-10 range) for 48 hours, the drug dosage should be decreased to the next lower level of drug therapy.

If a high score diminishes precipitously with therapy (e.g., 16 to 8), the drug dosage should *not* be immediately reduced to the dosage prescribed for the lower score, but rather reduced gradually over 2-day periods using the reduction dosage schedule in order to prevent the redevelopment of symptoms of abstinence. Any infant who exhibits a precipitous drop in the total abstinence score should be placed on vital signs (heart rate and respiratory rate) every hour and temperature every 4 hours:

(a) Until his/her condition stabilizes, and
(b) To assure that central nervous system depression secondary to centrally active therapeutic agents is detected early and appropriate intervention is taken as needed.
(c) To determine if any underlying medical problems are developing (e.g., sepsis, hypocalcemia, hypoglycemia, etc.).

DOSAGE REDUCTION SCHEDULES ONCE THE TOTAL ABSTINENCE SCORE IS LESS THAN 8

(1) Paregoric

Where the score falls below 8 for 2 days, the dosage should be reduced to 0.6 cc/kg/day in four divided doses for 2 days. If the score continues to be less than 8 for 2 days, then therapy should be discontinued. If the score escalates again (to 8 or greater), maintain the therapy at 0.6 cc/kg/day until the total score is less than 8 for 2 days, then discontinue therapy.

(2) Phenobarbital

When the score has been less than 8 for 2 days, the dosage should be reduced to 4 mg/kg/day in three divided doses for 2 days. If the score continues

to be less than 8 for 2 days, then therapy should be discontinued. If the scores escalate again (to 8 or greater), maintain the therapy at the 4 mg/kg/day level until the total scores are less than 8 for 2 days, then discontinue therapy.

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